Studies on the Chironomid Midges of Tsushima and Iki Islands, Western Japan. Part 3. The Chironomid Species Collected on Iki Island.

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Abstract: Collection of the specimens of the insect family Chironomidae were conducted by Suzuki during 3 day period from March 27, 1998, by sweeping with insect net at the side of streams and rivers, and also in night time in two towns. The specimens were preserved in 70% alcohol, and a part of the specimens screened under a stereomicroscope were individually mounted on slide glasses, the wings are in dry and the body is in gum-chloral medium after digested in 10% KOH and dissected by our standard method. A total of 147 male specimens were examined, and were classified into 37 species of the family Chironomidae. They included 11 species of at least the Holarctic distribution, 11 species so far recorded only from Japan, and 15 new species apparently indgenous to this island. The species recorded in common with the neighboring island of Tsushima this time were only 5.

Key words: Chironomidae, Diptera, Medical entomology, New species, Asthma, Iki Island

INTRODUCTION

Iki Island is located on the channel between Korean Peninsula of continental Asia and Kyushu Island, Japan, with a population of about 55 thousands, and an area of 139 square km. It is roughly circular in shape, with a maximum height of 213 meters high from sea level, but the land is largely flat and more than 70% of the area is used as the rice paddies, with a product of 5,000 to 6,000 tons of rice per year.

Tsushima Island is located also on the channel between Korea and Kyushu some 30 km northwest of Iki, has a population of about 70 thousands and an area of 682 square km, and an annual rainfall of about 1,500-2,000 mm. The land is largely mountainous, divided into many areas by valleys and streams, and the highest point is about 600 meters from sea level.

The studies on chironomid fauna of these islands are interesting at least from two standpoints, in order to know the relationship between those of the eastern continental Asia and Japan, and also to compare the difference in the two closely situated islands with remarkably different environmental conditions.

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Fig. 16 c), other scutal areas, scutellum and postnotum black, abdomen and legs dark brown. Head in Fig. 16 a. Eyes bare, reniform, ER 0.97. Antenna with 13 flagellar segments, AR 1.88, 1.74, AHR 0.63, 0.62. Palp long, P/H 1.11. Antepronotum (Fig. 16 b) united in the middle, with 6:6, 8:8 (very many) lateral setae. Setae on scutum and scutellum in Fig. 16 c; DM 12, 14 (all minute), DL 10:11, 14:14, PA 10:10, SC 16, 20 (in two transverse rows), all well developed.

Wing (Fig. 16 d) membrane bluish, bare but granular, squama with 7:7, 9:8 fringe hairs, anal lobe well developed and produced inwards. Costa extended beyond tip of R4+5. Cu2 conspicuously sinuate. RR 0.42, VR 1.17, R/Cu 1.08. fLR 0.66, 0.66, mLR 0.46, 0.43 (very small), hLR 0.76, fTR 0.14, 0.13, fBR 3.2, 3.4, mBR 3.3, 3.5, hBR 3.5. Pulvilli well developed, brush-like (Fig. 16 e, hind tarsus V). Setae on abdominal tergites (Fig. 16 f, left half) are rather numerous, 38 on I, 57 on II, 66 on III, 64 on IV to VI, 60 on VII, and 56 on VIII.

Hypopygium in Fig. 16 g. Anal point (also in Fig. 16 h) nearly V-shaped, 50 microns high and 50 microns wide at the base, with clearly defined concave basal margin, and densely covered by short setae and microtrichia. Virga (also in Fig. 16 h) composed of 6 simple codes. Posterior margin of anal tergite concave in the middle. Inner lobe of gonocoxite (also in Fig. 16 i) large, roughly rectangular, with short setae and microtrichia. Gonostylus (also in Fig. 16 j) simple, widest at about middle and inner margin slightly convex, without preapical swelling.

Remarks. These specimens are considered as belonging also to the genus *Limnophyes,* since eyes bare and reniform, wing membrane bare and granular, costa extended, Cu2 curved, and anal point is covered by short setae and microtrichia. It belongs to the group of this genus with megaseta on gonostylus and the number of DL setae are rather small and all simple, and thus somehwat related to *L. habilis* (Walker) among the European species of this genus in that anal lobe of wing is well developed, but in the latter anal point is absent and inner lobe of gonocoxite is much smaller. Among the Japanese species of this genus listed in Sasa and Kikuchi (1995, p.177), the present species is related most closely to *L. akanundecimus* Sasa et Kamimura, 1987, in that gonostylus with megaseta, scutum without lamellar setae, antenna with 13 flagellar segments, costa is extended beyond tip of R4+5, and anal point is small, conical and with setae and microtrichia, but in *L. akanundecimus* AR is 0.87 and much smaller, inner lobe of gonocoxite is much smaller an narrower, and scutellar setae are only 6 in a transeverse row. This new species is also unusual in that legs with a pair of large, brush-like pulvilli (according to the monograph of Cranston *et al.* 1989, p.207, pulvilli are absent in this genus).

27. *Limnophyes ikimeneus* sp. nov. (Figs. 17 a-j)

Ten males were collected by sweeping, 9 at Umenoki Dam on 27 March, No.376:03-09 (#2:7:6-12), No.357:42 (#2:7:4), No.357:36 (#2:7:3). Another at Danjodake Dam, No.357:43 (#6:14:2). BL 2.08-2.53 (2.26 in average of 10) mm, WL 1.16-1.32 (1.24) mm, WW/WL 0.29-0.31 (0.30). Body almost uniformly brown. Head in Fig. 17 a. Eyes bare, reniform, ER 1.44-1.76 (1.60). Antenna with 12 flagellar segments, AR 0.52-0.72 (0.65), AHR 0.34-0.56

individually mounted slide specimens and were examined under compound microscope. They were classified into 37 species belonging to 22 genera, and 11 species among them were identified as belonging to the same species as those with a cosmopolitan distribution in common with that previously recorded mainly from Europe, 11 species are belonging to that recorded previously only from Japan, and 15 are new species. Only 5 species among them were in common with those collected at the same period from Tsushima Island this time, namely *Cladotanytarsus tusimajekeus, Cricotopus bicinctus, Paratrichocladius refiventris, Toyamayusurika shiotanii,* and *Thienemanniella vittata.*

DISCUSSION

Collections of chironomid midges were conducted by Suzuki on Tsushima Island during 3 day period from March 24, 1998, also by sweeping with insect net and with light traps. As reported in the previous two papers by Sasa and Suzuki (1999, a, b), a total of 377 specimens among the collections were individually mounted on slides, and were classified into as many as 110 species of Chironomidae, including 48 species under Chironominae (34 new species), 56 speies under Orthocladiinae (including 31 new species), and 6 species of Tanypodinae (including 2 new species). Those in common with Iki and Tsushima Islands were only 5 species. Such a fact reflect that the distribution of the chironomid species is highly dependent on the local enviriomental factors, especially on the type of land waters, and less on the difference in geographic factors.

Notes on the chironomid spepcies collected on Iki Island

1. *Chironomus nipponensis* Tokunaga, 1940

A male was collected by sweeping at the side of Umenoki Dam on March 27. No.357:25 (#2-1). BL 8.86 mm, WL 4.18 mm, WW/WL 0.29. Scutal stripes, scutellum and postnotum largely black, humeral areas of scutum yellow, abdominal tergites largely black and II to VIII each with a narrow yellow band along posterior margin, the dark areas extending posteriorly in the middle forming a V-shaped process, the most characteristic distinguishing marks from other related *Chironomus* species. ER 0.14 (very small), AR 4.33 (very high), AHR 0.65, P/H 1.27, SO 46:47, CL 46, PN 0:0, DM 32, DL 38;42, PA 9:8, SC 38, SQ 36:36, RR 0.37, VR 1.04, R/Cu 1.24, fLR 1.37, mLR 0.63, hLR 0.77, fTR 0.24, fBR 2.0, mBR 1.9, hBR 4.7.

This is one of the common species of *Chironomus* in Japan, and has been collected at a number of localities from northern to southwestern Japan (Sasa and Kikuchi, 1995, p.25).

2. *Dicrotendipeps lobiger* (Kieffer, 1921)

Eight males were collected by sweeping at Satofure on March 27. No.357:03, 04, 45 (#1:3, 4, 4:2), No.372:91-94 (#1:3:2, 1:4:3-5), BL 5.36-5.89 (5.66 in average of 8) mm, WL 2.40-2.72 (2.58) mm, WW/WL 0.27-0.30 (0.28). Scutal stripes and postnotum brown, other scutal areas pale, legs and abdomen yellow. ER 0.28-0.30 (0.29). Antenna with 11 flagellar segments, AR 1.89-2.69 (highly variable), AHR 0.56-0.63 (0.59). P/H 0.90-1.08 (1.01). SO

18-28 (24.0), CL 14-22 (17.0). DM 13-17 (15.0), DL 13-19 (14.7),, PA 5-8 (6.6), SC 20-25 (22.6). Wing bare, SQ 28-33 (31.0), RR 0.19-0.29 (0.25), VR 1.14-1.22 (1.18), R/Cu 1.13-1.14. fLR 1.57-1.72 (1.62), mLR 0.52-0.56 (0.54), hLR 0.67-0.72 (0.69), fTR 0.24-0.27 (0.25), fBR 2.3-3.2 (2.6), mBR 2.1-3.8 (2.9), hBR 3.3-4.3 (3.8). Pulvilli well developed, brush-like. Hypopygium as described and illustrated by Sasa (1984, p. 43).

This species was originally described from Europe, and also from northern and western Japan (Sasa and Kikuchi, 1995, p.28).

3. *Paratendipes tamayubai* Sasa, 1983 (Figs. 1 a-m)

Two males were collected by sweeping at Satofure on March 27. No.357:01, 02 (#1:1, 2). BL 4.88, 5.62 mm, WL 2.44, 2.78 mm, WW/WL 0.28, 0.28. Scutal stripes and postnotum brown, other scutal areas, scutellum, abdomen and legs yellow. Head in Fig. 1 a. Eyes bare, ER 0.18, 0.37. Antenna with 13 flagellar segments, AR 1.60, 1.64, AHR 0.57, 0.55. Palp long, P/H 1.33, 1.44. SO 13:12, 16:16, CL 13, 12. Antepronotum (Fig. 1 b) tapering towards middle and separated, with 2:2, 4:3 lateral setae. Setae on scutum and scutellum in Fig. 1 c; DM 8, 5, DL 12:10, 9:11, PA all 4, SC 10, 11.

Wing (Fig. 1 d) bare, squama with 18:18, 14:12 fringe hairs. RR 0.28, 0.36, VR 1.12, 1.11, R/Cu 1.13, 1.15. Tip of front tibia (Fig. 1 e) with a short and pointed scale, terminal scales of middle and hind tibiae (Figs. 1 f, g) fused and with two short spurs (characteristic to this genus). fLR 1.28, 1.32, mLR 0.60, 0.57, hLR 0.71, 0.66, fTR 0.23, 0.22, fBR 3.2, 2.8, mBR 3.4, 3.0, hBR 3.6, 3.4. Legs with a pair of brush-like pulvilli (Fig. 1 h, front lelg).

Hypopygium in Fig. 1 i. Anal point constricted in the middle. Dorsal appendage (Figs. 1 j,k) elongate oval and apically hooked, with a 4 lateral and 1 basal setae. Median appendage (Fig. 1 m) triangular and bearing numerous simple setae. Ventral appendage (also in Fig. 1 m) short, rounded and distally expanded, bearing numerous recurved setae. Gonostylus stout, inner margin slightly concave.

Remarks. This species was first recorded from an upstream part of Tama River (Tokyo), and from streams in Toyama and Hokkaido.

4. *Polypedilum nubifer* (Skuse, 1889)

A male was collected by sweeping at Umenoki Dam on 27 March. No. 357:27 (#2:3). BL 7.14 mm, WL 3.26 mm, WW/WL 0.28. Scutum, scutellum and postnotum black, abdomen dark brown, legs brown. Eyes bare, ER 0.43. Antenna with 13 flagellar segments, AR 2.21, AHR 0.61. P/H 1.05. SO 14:14, CL 50. Antepronotum united, with 8:9 lateral setae (a characteristic of this species). DM 24, DL 28:28, PA 11:13, SC 15. Wing bare, SQ 34:36, RR 0.19, VR 1.10, R/Cu 1.14. Tip of front tibia with a broad and rounded scale bearing 1 long seta. Tip of middle and hind tibiae with two comb scales, one with a long spur, the other without spur. Pulvilli large, brush-like. Hypopygium as illustrated by Sasa and Sublette (1979), dorsal appendage long, horn-like and apically hooked, without lateral seta. This is a cosmopolitan distributed species, and is the type spepcimen of genus *Polypedilum* Kieffer, 1913, and its taxonomic status was discussed by Sasa and Sublette (1979).

5. *Polypedilum nubeculosum* (Meigen, 1804)

A male was collected by sweeping at Kugiyamafure on March 28. No.357:92 (#7:12).

BL 6.16 mm, WL 3.12 mm, WW/WL 0.28. Scutum and postnotum black, scutellum, abdomen and legs dark brown. Eyes bare, ER 0.27. Antenna with 13 flagellar segments, AR 2.18, AHR 0.66. P/H 1.17. SO 15:14, CL 36. Antepronotum separated, without lateral seta (a distinguishing character from *P. nubifer*). DM 14, DL 32:30, PA 10:9, SC 24 (larger than in *P. nubifer*). Wing bare, SQ 33:32, RR 0.24, VR 1.09, R/Cu 1.17. fLR 1.37, mLR 0.56, hLR 0.74, fTR 0.24, fBR 3.3, mBR 3.8, hBR 6.9. Pulvilli large, brush-like.

This species also has a cosmopolitan distribution, and has been collected also from a number of localities in Japan, and very similar in body coloration and measurement data with the above species, *P. nubifer,* and seems to be mixed up with it in old literatures, but can clearly be differentiated by the absence of lateral setae on postnotum and presence of a long lateral seta on dorsal appendage.

6. *Stenochironomus ikiabeus* sp. nov. (Figs. 2 a-k)

Three males were collected by sweeping at Oushimizu on March 28. Holotype: No.357:68 (#3:4:3). Paratypes: No. 357:31, 69 (#3:4:2, 4). BL 5.72, 6.78, 6.14 mm, WL 3.08, 3.12 mm, WW/WL 0.28, 0.29. Median and lateral stripes of scutum slightly brownish yellow, posteior portion of lateral stripes darker than the anterior portion, other scutal areas and scutellum pale (Fig. 2 c), postnotum yellowish brown, abdominal tergites largely pale but V to Ⅷ and hypopygium slightly brownish in the middle, legs almost uniformly yellow. Head in Fig. 2 a. Eyes bare, ER 0.36, 0.38 0.49. Antenna with 13 flagellar segments, AR 1.98, 1.78, 2.17, AHR 0.54, 0.53, 0.59. Palp long, P/H 1.23, 1.21, 1.13. SO all 18, CL 26, 24, 24. Anteprontum (Fig. 2 b) united, without lateral seta. Scutum and scutellum in Fig. 2 c; DM 23, 23, 31, DL 14:14, 20:18, 22:21, PA 7:8, 7:7, 9:8, SC 18, 16, 27.

Wing (Fig. 2 d) bare, with a faint dark cross band in the middle portion SQ 24:24, 26:26, 17:16. R2+3 in contact with R1, VR 1.06, 1.05, R/Cu 1.16, 1.14. Terminal scale of front tibia (Fig. 2 e) broad and bearing 3 long setae. Terminal combs of middle and hind tibiae (Figs. 2 f, g) contiguous and with two short spurs (a characteristic of this genus). fLR 1.23, 1.22, mLR 0.66, 0.66, 0.67, hLR 0.79, 0.77, 0.79, fTR 0.22, 0.20, fBR 4.4, 3.2, mBR 6.1, 5.7, 7.3, hBR 7.8, 4.9, 4.9. Pulvilli well developed, brush-like (Fig. 2 h, hind tarsus V).

Abdominal tergites with relatively large numbers of setae, 56 on Ⅰ, 68 on Ⅱ, 64 on Ⅲ to V, 60 on Ⅵ and Ⅶ, and 56 on Ⅷ. Hypopygium in Fig. 2 i. Anal point long, narrow, parallel-sided and apically rounded and not expanded. Ninth tergite with rounded posterior margin, with some 20 long setae on the middle portion and 12 setae along posterior margin. Dorsal appendage (Fig. 2 j) small, triangular, and with 4 short setae. Ventral appendage extremely long, inner margin smoothly curved, with a long apical spur, and 4 setae on distal 1/3 of inner margin. Gonostylus long, slightly expanded near apex.

Remarks. This species is structurally a typical member of genus *Stenochironomus* Kieffer, 1919, especially in that antenna with 13 flagellar segments, antepronotum reduced towards middle and not united, terminal comb scales of middle and hind tibiae with two short spurs, pulvilli well developed, dorsal appendage small and triangular, ventral appendage extremely long and with an apical spine. It is somewhat similar among the European spcies of this genus to *S. gibbus* (Fabricius) in that anal point is slender and not apically expanded, but

it has a long lateral seta on ventral appendage, which is absent in the present species. A total of 11 species have so far been recorded from Japan, among which the present species is most closely related to *S. shoubimaculatus* Sasa, 1989, in that scutum with dark and pale areas, wing with a cross dark band, tarsi entirely pale, but this species has dark and pale marks on femora and tibiae, dark marks on scutum more conspcuous, anal point is darkly pigmented, ventral appendage is distally expanded, and gonostylus is tapering towards apex (distally expapnded in the present new species).

7. *Stictochironomus histrio* (Fabricius, 1794)

A male was collected by sweeping at Umenoki Dam on March 27. No.357:266 (#2:2). BL 7.68 mm, WL 3.84 mm, WW/WL 0.29. Scutum, scutellum, postnotum and abdomen largely black; femora largely dark brown and each with a narrow preapical pale ring; tibiae divided into the basal, median and distal dark rings and two pale rings between them, all nearly equal in length; basal portions of tarsi I and II of each leg pale, and gradually darkened towards brown areas; tarsi III to V brown. ER 0.24, AR 2.68, AHR 0.63, SO 16:16, CL 34. Antepronotum divided in the middle with a V-shaped groove. DM 10, DL 15:15, PA 6:6, SC 34. Wing bare, SQ 32:34, RR 0.38, VR 0.93, R/Cu 1.16. Front tibia with a broad and rounded terminal scale, terminal comb scales of middle and hind tibiae contiguous and with one spur. fLR 1.12 (very low as a member of Chironominae), mLR 0.58, hLR 0.71, fTR 0.22, fBR 3.3, mBR 5.2, hBR 6.0. Pulvilli well developed, brush-like. Hypopygium of a Japanese specimen as described and illustrated by Sasa (1985).

Remarks. This is again a cosmopoliten species, and has been recorded also from Honshu and Hokkaido (Sasa and Kikuchi, 1985, p. 43).

8. *Cladotanytarsus tusimajekeus* Sasa et Suzuki, 1999 (Figs. 3 a-p)

Four males were collected by sweeping at Oushimizu on March 28. No.357:77-80 (#3:20:2-5). BL 1.94-2.06 (2.02 in average of 4) mm, WL 1.16-1.24 (1.20) mm, WW/WL 0.32-0.35 (0.33, very wide). Scutal stripes and postnotum brown, other scutal areas and scutellum pale, legs and abdomen yellow. Head in Fig. 3 a. Eyes bare, reniform, ER 1.15-1.56 (1.35). Antenna with only 10 flagellar segments in all the 4 specimens, AR 0.53-0.65 (0.59), AHR 0.36-0.46 (0.43). SO all 4 (1 inner and 3 lateral), CL 8-12 (10.3). Antepronotum (Fig. 3 b) widely separated, without seta. Scutum and scutellum in Fig. 3 c; DM 8-12 (9.5), DL 6:6 in 1 and 7:7 in other 3, PA all 1, SC 2, 4 or 6 (4.5).

Wing (Fig. 3 d) with macrotrichia only in the extreme distal area. R1 and R4+5 running very closely, but R2+3 separated and RR 0.55-0.71 (0.63). VR 1.36-1.41 (1.39), R/Cu 0.96-1.00 (0.98). Tips of tibiae the *Tanytarsus* type, *i.e.* front tibia (Fig. 3 e) with a long, narrow and sharply pointed terminal spur, middle and hind tibiae (Figs. 3 f,g) with two separated terminal comb scale and both with a long spur. fLR 1.61-1.71 (1.67), mLR 0.47-0.48, hLR 0.53-0.54, fTR 0.27-0.30 (0.28), fBR 2.3-3.3 (2.8), mBR 3.6-3.7, hBR 4.8-5.4 (5.1). Pulvilli small, brush-like (Fig. 3 h, hind tarsus V).

Setae on abdominal tergites (Fig. 3 i) are small in the numbers and are arranged into the anterior and posterior transverse rows, 4 and 6 (total 10) on I to III, 6 and 6 on 4 to 6, and 6 and 4 on VII and VIII. Hypopygium in Fig. 3 j. Anal point (also in Fig. 3 k) widest at

base and apically rounded, clothed in microtrichia, and with 6 lateral setae. Dorsal appendage (Fig. 3 m) composed of a base with 3 lateral setae and an inner process bearing 3 setae, and a large distal claw-like process. Median appendage (Fig. 3 n) short, composed of a shaft and some 6 simple setae. Ventral appendage (Fig. 3 p) long, finger-like, slightly expanded apically, and with 10 short recurved apical setae. Gonostylus simple, widest at about middle.

Remarks. From the above structures and measurement data, these specimens also belong to *C. tusimajekeus* Sasa et Suzuki, 1999, recorded in our paper previous as new species from Tsushima. Especially characteristic is the structure of antenna, being composed of only 10 flagellar segments.

9. *Tanytarsus ikicedeus* sp. nov. (Figs. 4 a-m)

Tree males were collected by sweeping at Satofure on March 27. Holotype: No.357:18 (#1:18:1). Paratypes: No. 357:20 (#1:19), 357:85 (#5:8:5). BL 3.26, 3.12, 326 mm, WL 1.82, 1.82, 1.80 mm, WW/WL all 0.31. Scutal stripes and postnotum yellowish brown, other scutal portions and scutellum pale, abdomen and legs yellow. Head in Fig. 4 a. Frontal tubercles absent in all the 3 specimens. Eyes bare, both with a wedge-shaped dorsomedial extension, ER 0.96, 0.86, 0.81. Antenna with 13 flagellar segments, AR 0.90, 0.92, 1.00, AHR 0.53, 0.49, 0.52. Palp long, P/H 1.23, 1.21, 1.16. SO 8:8, 10:10, 10:10, CL 14, 11, 14. Antepronotum (Fig. 4 b) widely separated, without seta. Setae on scutum and scutellum in Fig. 4 c; DM 16, 14, 10, DL 7:7, 8:8, 9:9, PA all 1:1, SC 4, 6, 2.

Wing in Fig. 4 d. Squama bare, anal lobe nearly flat. Membrane with macrotrichia on the principal veins, and rather sparsely between R and M, M and Cu, and Cul and Cu2. RR 0.40, 0.38, 0.46, VR 1.24, 1.19, 1.19, R/Cu 1.10, 1.08, 1.08. Tip of front tibia (Fig. 4 e) with a long, narrow and apically pointed terminal scale. Tips of midle and hind tibiae (Figs. 4 f,g) with two comb scales, both with a spur. fLR 2.09, 2.19, 2.29, mLR 0.63, 0.62, 0.65, hLR 0.70, 0.69, fTR 0.35, 0.36, 0.33, fBR 2.8, mBR 6.0, 3.6, hBR 5.1, 4.8.

Setae on abdominal tergites (Fig. 4 h) are rather small in the numbers, 14 on Ⅰ and Ⅱ, 16 on Ⅲ and Ⅳ, 20 on Ⅴ, and 24 on Ⅵ to Ⅷ in the holotype, and those on Ⅰ to Ⅶ are arranged into the anterior and the posterior transverse rows. Hypopygium in Fig. 4 i. Anal point widest at base and tapering towards rounded apex, with lateral ridges and 6 spine clusters. Dorsal appendage and digitus in Figs. 4 j (left, dorsal), k (left ventral); the former roughly oval and with 6 setae on dorsal side and a basal seta on ventral side; digitus broad, D-shaped and twisted upwards like and extension of dorsal appendage, a peculiar structure of this species. Median and ventral appendages in Fig. 4 m; the former short and with simple setae directed inwards; the latter finger-like, with 10 recurved setae on dorsal side and 4 caudally directed setae on ventral side of the apical portion. Gonostylus widest at about basal 1/3 and with rounded apex.

Remarks. This spepcies belongs to the *mendax* group of genus *Tanytarsus* van der Wulp, 1879, since anal point with lateral ridges and spine clusters, and digitus is large, but is quite unusual in that digitus is very wide, twisted and attached to the apex of dorsal appendage like its extension, a quite peculiar structure not seen in previously recorded species of this group. Among the previously recorded species of this group, it is somewhat related to

T. tamaoctavus Sasa, 1980, in that digitus is broad and twisted upwards, but in the latter median appendage is absent and anal point is long, narrow and medially expanded.

10. *Tanytarsus ikideeus* sp. nov. (Figs. 5 a-j)

Forty four (44) males were collected by sweeping at Oushimizu on March 28 and mounted on slides. No. 357:75 (#3:16:2), No.374:58-100 (#3:16:3-46). Holotype: 374:87 (3:16:32). Paratypes: Othter 43 specimens. Scutal stripes brown, other scutal areas and sculellum yellow, postnotum dark brown, abdomen and legs brownish yellow. Nine males among them were measured. Head in Fig. 5 a. Eyes bare, ER 0.61-0.73 (0.67 in average of 9). Antenna with 13 flagellalr segments, AR 1.06-1.22 (1.12), AHR 0.52-0.58 (0.54). P/H 0.92-1.00 (0.96). SO 8-13 (10.8), CL 12-18 (15.6). Frontal tubercles (Fig. 5 b) small, 9 microns long, 6 microns wide at the base, and 58 microns apart from each other in the holotype. Antepronotum (Fig. 5 c) separated, without seta. Setae on scutum and scutellum in Fig. 5 d; DM 7-17 (11.4 in average of 9), DL 6-10 (7.3), PA 1 or 2 (1.2), SC 2 or 4 (3.0). Wing (Fig. 5 e) with small numbers of macrotrichia only in the distal portion, like in *Cladotanytarsus* species. RR 0.27-0.39 (0.32), VR 1.15-1.28 (1.22)), R/Cu 1.08-1.13 (1.10). fLR 1.70-2.08 (2.01), mLR 0.54-0.58 (0.56), hLR 0.66-0.72 (0.70), fTR 0.29-0.33 (0.30), fBR 2.4-4.3 (3.6), mBR 4.4-6.9 (5.3), hBR 4.1-5.9 (4.9).

Hypopygium in Fig. 5 f. Anal point (also in Fig. 5 g, holotype; 5 h, paratype No.374:94) long, narrow, smoothly tapering towards truncate or rounded apex, with lateral ridges and 5-8 spine clusters. Dorsal appendage (Fig. 5 i) roughly oval but inner margin concave and apically hooked, with 2 or 3 inner setae each arising on a tubercle, 1 or 2 dorsal setae and 3 or 4 lateral setae, and a basal seta arising on a large tubercle. Digitus (also in Fig. 5 i) long and wide, nearly parallel-sided and apically rounded. Median and ventral appendages in Fig. 5 j; the former short, with short setae directed inwards, the latter stout and with some 10 recurved and 3 or 4 caudally directed setae in the apical portion. Gonostylus simple and nearly parallel-sided.

Remarks. This species also belongs to the *mendax* group of genus *Tanytarsus,* since anal point with lateral ridges and spine clusters, digitus is very long, and median appendage is short and directed inwards. It is somewhat related to *tamagotoi* Sasa, 1983, among the species of this group, in that dorsal appendage is constricted near apex, digitus is long, parallel-sided and apically rounded, median appendage is short and setae are simple and directed inwards,, spine clusters on anal point is only 5-8, and frontal tubercles are small, but in *T. tamagotoi* tip of dorsal appendage is more strongly hooked, basal seta of digitus is arising on a small tubercle, and wing is entirely clothed with macrotrichia. The presence of only a small number of macrotrichia restricted to the tip area is a remarkable character of the present spepcies.

11. *Tanytarsus ikiefeus* sp. nov. (Figs. 6 a-i)

Two males were collected by sweeping at Oushimizu on March 28. Holotype: No.372:83 (#3:16:73). Paratype: No.372:84 (#3:16:70). BL 4.52, 4.88 mm, WL 2.40, 2.56 mm, WW/WL 0.28, 0.27. Scutal stripes and postnotum dark brown, other scutal portions, scutellum, abdomen and legs brownish yellow. Head in Fig. 6 a. Frontal tubercles (Fig. 6 b) large, 33

microns long, 22 microns wide at the base, and 60 microns apart from each other. Eyes bare, ER 0.72, 0.71. Antenna with 13 flagellar segments, AR 1.50, 1.45, AHR 0.55, 0.57. P/H 1.12, 1.17. SO 15:17, 12:14, CL 22, 15. Antepronotum (Fig. 6 c) widely separated, without seta. Setae on scutum and scutellum in Fig. 6 d; DM 10, 12, DL 10:10, 9:8, PA 1:2, 1:1, SC 10, 8.

Wing (Fig. 6 e) with small numbers of macrotrichia only in the distal portion, but venation like in other *Tanytarsus* species. Squama bare, anal lobe nearly flat. RR 0.34, 0.36, VR 1.15, 1.13, R/Cu 1.11, 1.12. Tip of front tibia with a short and narrow terminal process, tips of middle and hind tibiae with two comb scales, both with a spur, as in other *Tanytarsus* species. Legs with a pair of small brush-like pulvilli. fLR 2.10, mLR 0.67, 0.63, hLR 0.67, 0.70, fTR 0.31, fBR 2.9, mBR 3.3, hBR 4.1.

Hypopygium in Fig. 6 f. Anal point with lateral ridges, 3 or 6 spine clusters, and 2 pairs of short lateral setae. Dorsal appendage (Figs. 6 g,h) roughly oval but inner margin slightly concave and with a short apical process, and with a 3 inner, 3 lateral and 2 dorsal setae, but without basal seta. Digitus absent. Median and ventral appendages in Fig. 6 i; the former relatively long, with simple setae reaching to near tip of ventral appendage; ventral appendage with 20 recurved setae on dorsal side and 4 caudally directed setae on ventral side of apical portion.

Remarks. The structure of hypopygium of this species is typical as a member of the *oyamai* group of genus *Tanytarsus,* in that anal point with lateral ridges and spine clusters, dorsal appendage is roughly oval and digitus is absent, and median appendage with relatively long and simple setae reaching to near tip of ventral appendage, but is quite unusual in that wings with only a small numbers of macrotrichia rectricted to the tip areas, like in those of the species of genus *Cladotanytarsus.* Most of the above structures and measurement data are coincident with that of *T. konishii* Sasa et Kawai, 1985, collected first in Toyama and later also from Lake Biwa, but in this species body coloration is much darker and wings with macrotrichia on almost entire surface, and therefore the present specimens are recorded as a new species.

12. *Tanytarsus ikifegeus* sp. nov. (Figs. 7 a-h)

Three males were collected by sweeping at Katsumoto Dam on March 28. Holotype: No. 357:82 (#5:8:2). Paratypes: No. 357:83, 84 (#5:8:3, 4). BL 3.48, 3.62, 3.52 mm, WL 2.04, 2.00, 2.02 mm, WW/WL 0.28, 0.30, 0.30. Scutal stripes and postnotum brown, other scutal areas, scutellum and abdomen pale, legs slightly yellowish. Head in Fig. 7 a. Frontal tubercles (Fig. 7 b) very large, 47 microns long and 19 microns wide at the base, tapering towards pointed apex. Eyes bare, ER 0.75, 0.81, 0.70. Antenna with 13 flagellar segments, AR 0.99, 1.12, 1.00, AHR 0.52, 0.56, 0.54. P/H 1.11, 1.15, 1.08. SO 8:8, 8:8, 10:10, CL 14, 15, 16. Antepronotum (Fig. 7 c) separated, without seta. Setae on scutum and scutellum in Fig. 7 d. DM 8, 7, 12, DL 8:8, 8:8, 10:10, PA all 1, SC 4, 6, 4.

Wing (Fig. 7 e) with macrotrichia rather sparsely but almost on entire surface, SQ all 0, RR 0.38, 0.41, 0.34, VR 1.21, 1.21, 1.11, R/Cu 1.12, 1.13, 1.09. Terminal structure of tibiae as in other species of this genus. fLR 2.40 (front tarsi are lost in the paratypes), mLR 0.64,

0.62, 0.67, hLR 0.73, 0.69, 0.75, fTR 0.37, fBR 3.2, mBR 5.8, 6.3, 6.2, hBR 6.8. 5.3. 6.6.

Hypopygium in Fig. 7 f. Anal point with lateral ridges and 4 or 5 spine clusters, and 5 or 6 lateral setae and 4 or 5 basal setae on both sides. Bands of ninth tergite separated. Dorsal appendage (Fig. 7 g) roughly oval, inner margin smoothly convex and with 3 inner, 3 dorsal and 3 lateral setae. Digitus small and plate-like, slightly extended beyond inner margin of dorsal appendage, or hardly detectable under dorsal appendage. Median and ventral appendages in Fig. 7 h, the former short, with only simple setae, the latter with 10 recurved setae on dorsal side and 3 caudally directed setae on ventral side of apical portion.

Remarks. This specimens belong to the *oyamai* group of genus *Tanytarsus,* in that anal point with lateral ridges and spine clusters, and digitus is very short or hardly detectable. They are especially characterised by that antenna with 13 flagellar segments and AR is about 1.0, large frontal tubercles are present, anal point with 4 or 5 spine clusters, dorsal appendage is oval, digitus is very small and hardly detectable, and median apppendage is relatively long and directed backwards. Such structures are similar to *T. miyakoflavus* Sasa et Hasegawa, 1988, recorded first from Miyako Island, southern Okinawa, but the present specimens are considered as belonging to a new species, since small digitus is present, and median appendage without lamellar setae, which are present in *T. miyakoflavus.*

13. *Tanytarsus oyaberotundus* Sasa, Kawai et Ueno, 1988 (Figs. 8 a-f)

A male was collected by sweeping at Satofure on March 27. No.357:21 (#1:20). BL 3.90 mm, WL 2.08 mm, WW/WL 0.29. Scutal stripes and postnotum brownish yellow, other scutal areas and scutellum pale, abdomen and legs yellow. Frontal tubercles (Fig. 8 a) prominent, cylindrical, 19 microns long, 6 microns wide, and 42 microns apart from each other. Eyes bare, ER 0.64. Antenna with 13 flagellar segments, AR 1.07, AHR 0.51. P/H 1.04. SO 9:9, CL 16. Antepronotum (Fig. 8 b) separated, without seta. DM 18, DL 12:12, PA 1:1, SC 4. Wing with macrotrichia rather sparely, squama bare, anal lobe nearly flat. RR 0.40, VR 1.18, R/Cu 1.08. Front and hind tarsi lost, mLR 0.63.

Hypopygium in Fig. 8 c. Anal point (also in Fig. 8 d) widest at base, distal half parallel-sided, with lateral ridges, 2 pairs of lateral setae, and 3 spine clusters. Dorsal appendage (Fig. 8 e) roughly triangular, apically hooked, with 4 lateral, 3 inner, and 1 basal setae. Digitus (also in Fig. 8 e) long, parallel-sided and apically rounded. Median and ventral appendages in Fig. 8 f; the former short, with simple setae directed inwards; the latter with 8 recurved dorsal setae and 4 caudally directed ventral setae arising in the apical portion.

Remarks. This species also belongs to the *mendax* group of genus *Tanytarsus,* and is especially characterised in that frontal tubercles are long and cylindrical, anal point is peculiar in the structure, dorsal appendage is roughhly triangular and apically hooked, digitus large, straight and apically rounded, and median appendage with short and simple setae directed inwards. Such morphological characters and measurement data are almost coincident with those of *T. oyaberotundus* Sasa, Kawai et Ueno, 1988, recorded from rivers in Toyama and also at the side of Lake Towada, Aomori.

14. *Tanytarsus tsutaprimus* Sasa, 1991 (Figs. 9 a-g)

A male was collected by sweeping at Touda Dam on March 28. Holotype: No.357:55

(#8:12). BL 4.12 mm, WL 1.92 mm, WW/WL 0.29. Scutal stripes and posterior half of postnotum brown, other thorax portions, abdomen and legs largely pale and slightly yellowish. Frontal tubercles absent (Fig. 9 a). ER 0.65. Antenna with 13 flagellar segments, AR 1.09, AHR 0.53. P/H 1.05. SO 11:11, CL 16. Antepronotum (Fig. 9 b) widely speparated, without seta. DM 10, DL 9:9, PA 1:1, SC 4. Wing thickly covered by macrotrichia on almost entire surface, squama bare, anal lobe nearly flat. RR 0.42, VR 1.24, R/Cu 1.12. fLR 2.29, mLR 0.63, hLR 0.71, fTR 0.35, fBR 3.4, mBR 6.7, hBR 7.4. Pulvilli absent.

Hypopygium in Fig. 9 c. Anal point (also in Fig. 9 d) abruptly constricted in the middle, with lateral ridges, 3 spine clusters, and 3 pairs of basal setae. Dorsal appendage (Figs. 9 e, dorsal; 9 f, vetral view) roughly oval, inner margin slightly hooked near apex, with 4 lateral, 4 dorsal and 3 inner setae. Digitus long, nearly parallel-sided and apically rounded, extending much beyond inner margin of dorsal appendage. Median and ventral appendages in Fig. 9 g; the former short, with simple setae directed inwards; ventral appendage with 10 recurved setae on dorsal side and 4 caudally directed setae on ventral side of apical porton. Gonostylus with very short setae in two rows along inner margin.

Remarks. From the above morphological characters and measurment data, this specimen is considered as belonging to *Tanytarsus tsutaprimus* Sasa, 1994, which was originally recorded by a single male collected in Aomori Prefecture, northern Honshu, and later also from Tsushima this time. In the type specimen, frontal tubercles are also absent, ER 0.46, AR 0.90. P/H 1.15, SO 8:8, CL 10, DM 14, DL 6:7, PA 1:1, SC 4, fLR 2.89 (much higher), mLR 0.61, hLR 0.69, fBR 5.8, mBR 7.5, hBR 10.3.

15. *Tanytarsus yunosecundus* Sasa, 1984

A male was collected by sweeping at Satofure on March 27. No.357:19 (#1:18:2). BL 3.96 mm, WL 2.12 mm, WW/WL 0.27. Scutal stripes and postnotum brown, other scutal portions, scutellum and abdominal tergites pale, hypopygium and legs brownish yellow. Frontal tubercles very large, 38 microns long, 17 microns wide at the base, and 73 microns apart from each other. ER 0.63, AR 1.23, AHR 0.52, P/H 1.08. SO 10:10, CL 19. Antepronotum separated, without setae. DM 0, DL 12:14, PA 2:2, SC 8. Wing with macrotrichia rather sparsely. SQ 0:0, RR 0.43, VR 1.22, R/Cu 1.09. Terminal structure of tibiae typical as a member of this genus. fLR 2.44, mL 0.63, hLR 0.73, fTR 0.36, fBR 3.9, mBR 4.8, hBR 5.0. Anal point with lateral ridges and 5 spine clusters. Dorsal appendage roughly oval but inner margin concave near apex, with 3 lateral, 3 inner, and 1 basal seta arising on a small tubercle. Digitus large, inner margin concave, and with rounded apex. Median appendage composed of an extremely long shaft bearing very long and simple setae along inner margin, the distal setae extending much beyond tip of ventral appendage, the most remarkable characteristic of this species.

Remarks. This species was recorded first from Lake Yunoko located in the mountainous area of Nikko National Park, Tochigi, and later also from several lakes in Hokkaido and Honshu (Sasa and Kikuchi, 1995, p.51), and is quite characteristic in having extremely long median appendage in hypopygium, the tips of distal setae extending much beyond tip of ventral appendage.

16. *Cricotopus bicinctus* (Meigen, 1818)

A male was collected by sweeping at Touda Dam on March 28. No.357:61 (#8:17). WL 2.03 mm, AR 1.85, abdominal tergites Ⅱ and Ⅳ pale, tibiae and tarsi largely pale. This species has a world-wide distribution, and has been recorded widely also from Japan.

17. *Cricotopus ikigeheus* sp. nov. (Figs. 10 a-k)

A male was collected by sweeping at Touda Dam on March 28. Holotype: No.357:60 (#8:16). BL 4.28 mm, WL 2.04 mm, WW/WL 0.30. Scutal stripes and postnotum black, other scutal areas and scutellum yellow, abdominal tergites brown, legs brownish yellow. Head in Fig. 10 a. Eyes pubescent, reniform, ER 1.11. Antenna with 13 flagellar segments, AR 1.56, AHR 0.57. Palp very short, P/H 0.62. SO 10:10, CL 6. Antepronotum (Fig. 10 b) united, very small 4 lateral setae are discernible on left side. Setae on scutum and scutellum in Fig. 10 c; DM 16, all very small, DL 24:24, all decumbent and very small, PA 5:5, SC 6, both well developed. Wing in Fig. 10 d; Anal lobe of wings slightly produced inwards, costa slightly extended, Cu2 nearly straight. SQ 14:16, RR 0.54, VR 1.19, R/Cu 1.08. fLR 0.53, mLR 0.47, hLR 0.51, fTR 0.12, fBR 2.3, mBR 3.7, hBR 3.4. Small pulvilli present, brush-like (Fig. 10 e, hind tarsus V).

Abdominal tergites (Fig. f) with quite peculiar distribution of setae, the numbers are 42 on Ⅰ, 34 on Ⅱ, 32 on Ⅲ, only 25 on Ⅳ, 42 on Ⅴ, 44 on Ⅵ, 40 on Ⅶ, and 38 on Ⅷ, and those on Ⅱ to Ⅵ are distributed into the median and the lateral groups, the median groups on Ⅱ to Ⅳ are composed of only 4 or 3 setae situated on the midline. Hypopygium in Fig. 10 g. Anal point absent, ninth tergite with a pair of quite peculiar areas covered by numerous dots (Fig. 10 h). Virga (also in Fig. 10 i) composed of two codes 30 microns long situated on a cup. Inner lobe of gonocoxite (Fig. 10 j) longer than wide and with strong setae. Inner margin of gonocoxite without basal lobe. Gonostylus (Fig. 10 k) with broadly expanded inner margin, without preapical tooth.

Remarks. This species is a typical member of the genus *Cricotopus* van der Wulp, 1874, revised by Hirvenoja (1973), since eyes pubescent, dorsomedian and dorsolateral setae of scutum are minute and decumbent, wing bare, squama fringed, vein Cu2 nearly straight, and anal point is absent. It shows characters typical as the subgenus *Isocladius* Kieffer, 1909, in that pulvilli present, and setae on abdominal tergites Ⅱ to Ⅳ are distributed into 3 or 4 median row and lateral groups, but has no hump on the base of inner margin of gonocoxite, the most important structure as this subgenus. The distribution of setae on abdominal tergites are quite peculiar, and the presence of a pair of strange granular areas on anal tergite, very poorly developed lateral setae on antepronotum, the shape and structure of inner lobe of gonocoxite and strongly expanded gonostylus, are the characters separating this species from the previously recorded ones of this genus. The presence of this species suggest that the subgenus *Isocladius* Kieffer, 1909, cannot be clearly separated from *Cricotopus* s. str.

18. *Paratrichocladius rufiventris* (Meigen, 1830)

A male was collected by sweeping at Satofure on March 27. No.357:06 (#1:6). BL 4.24 mm, WL 2.22 mm, WW/WL 0.32. Thorax entirely black excepting bases of dorsolateral setae, abdominal tergites and legs dark brown. Eyes pubescent, ER 0.94. Antenna with 13

flagellar segments, AR 1.84, AHR 0.54. P/H 0.99. SO 6:6, CL 6. Antepronotum united, with 4:4 lateral setae. DM present (not countable due to dark scutum), DL 21:24, all well developed and arising on large pale bases. PA 4:4, SC 20. Squama with 18:18 fringe hairs, RR 0.59, VR 1.12, R/Cu 1.04. fLR 0.59, mLR 0.48, hLR 0.55, fTR 0.13, fBR 2.4, mBR 2.9, hBR 2.9. Pulvilli absent. Anal point absent, inner lobe of gonocoxite large, almost as long as wide and rounded. Gonostylus simple and widest at about middle.

The above morphological characters represent that the present specimen belongs to *P. rufiventris* (Meigen, 1830), which has a cosmopolitan distribution.

19. *Eukiefferiella coerulescens* (Kieffer, 1926)

Eight males were collected by sweeping; 2 at Satofure on March 27, No.357: 13, 15 (#1:13, 15); 6 at Touda Dam on March 28, No.357:57-59, 94-96 (#8:14, 15:1-5). BL 1.58-2.34 (2.10 in average of 8) mm, WL 0.93-1.40 (1.23) mm, both highly variable, WW/WL 0.34-0.39 (0.36, very wide). Scutal stripes and postnotum black, other scutal areas and scutellum pale, abdomen and legs brownish yellow. Eyes oval, highly pubescent, ER 1.30-1.57 (1.43). Antenna with 11 (in 3) or 12 flagellar segments, AR 0.31-0.52 (0.42), AHR 0.28-0.42 (0.34). Palp short, P/H 0.81-0.96 (0.87). SO 2 or 3 (2.5), CL 4, 6 or 7 (5.2). Antepronotum narrowly united, with 1 or 2 (1.5) lateral setae. DM 5-8 (6.5), DL 7-11 (8.9), PA 3 or 4, SC 2-5 (3.7).

Wing bare, very finely granular and brownish, squama bare, anal lobe obtuse. R2+3 in contact with R4+5. FCu much distal to R-m, VR 1.45-1.65 (1.56, very high). Tip of R4+5 much proximal to tip of Cul, R/Cu 0.77-0.90 (0.84). Cu2 narly straight. fLR 0.39-0.44 (0.42), mLR 0.41-0.43 (0.42), hLR 0.43-0.49 (0.46), all very low. fTR 0.11-0.15 (0.13), fBR 1.9-3.1 (2.5), mBR 1.8-3.5 (2.5), hBR 2.0-3.4 (2.6). Pulvilli absent. Hypopygium as illustrated by Sasa and Kawai (1987).

Remarks. These specimens are provisionally identified as belonging to *E. coerulescens* (Kieffer, 1926), originally described from Europe, and also in Japan by Sasa and Kawai (1987) from Toyama and by Sasa (1988) from Hokkaido, both based on small numbers of incomplete specimens.

20. *Orthocladius chuzeseptimus* Sasa, 1984

Five males were collected by sweeping at Satofure on March 27. No.357:05 (1:5), 372:96-99 (#1:5:2-5). BL 4.68-5.06 (4.84 in average of 4) mm, WL 2.74-2.82 (2.78) mm, WW/WL 0.28-0.30 (0.29). Eyes bare, ER 0.93-1.05 (0.97). AR 2.20-2.35 (2.27), AHR 0.62-0.66 (0.64). P/H 1.03-1.14 (1.09). SO 14-19 (15.8), CL 20-26 (23.3). Antepronotum united, PN 4-7 (5.0). DM 12-16 (14.7), all minute, DL 10-13 (10.9), well developed, PA 3-5 (4.3), SC 18-20 (19.5), in two transverse rows. Wing bare, SQ 21-40 (30.1), anal lobe extended inwards, RR 0.31-0.50 (0.40), VR 1.01-1.07 (1.03), R/Cu 1.08-1.11 (1.10). fLR 0.77-0.80 (0.79, very high), mLR 0.56-0.58 (0.57, also high), hLR 0.60-0.62 (0.61), fTR 0.13-0.14, fBR 2.7-4.5 (3.3), mBR 2.8-4.6 (3.3), hBR 3.6-4.8 (4.4). Hypopygium as described and illustrated for *O. chuzeseptimus* Sasa, 1984 (also in Sasa & Kikuchi, 1995, p.169, and Plate 63 D).

Remarks. These specimens are typical in the structure as members of the genus *Orthocladius* van der Wulp, 1873, and is considered as belonging to the subgenus *Orthocladius* s. str. in the shape of anal point being narrow, sharply pointed apically and with lateral setae,

but is unusual in that scutellar setae are rather numerous and distributed in two transverse rows like in those of subgenus *Euorthocladius* Thienemann. Such general structures and measurement data are almost coincident with that of *O. (O.) chuzeseptimus* Sasa, 1984, whose type specimens were collected from Lake Chuzenji, Nikko National Park. It belongs to the *Orthocladius glabripennis* group, which shows various variations in adult morphology, and further studies of immature stages and generic characters are required for final conclusion.

21. *Bryophaenocladius ikiheius* sp. nov. (Figs. 11 a-g)

A male was collected with a light trap at Ikishimaso on March 29. No.357:62 (#9:1). BL 2.93 mm, WL 1.74 mm, WW/WL 0.29. Scutum largely dark brown, humeral areas and scutellum pale, postnotum dark brown, abdomen and legs brownish yellow. Head in Fig. 11 a. Eyes bare, both with a wedge-shaped dorsomedial projection, ER 0.79. Antenna with 13 flagellar segments, AR 1.32, AHR 0.63. Palp short, P/H 0.82. SO 12:12, CL 12. Anteprono-tum (Fig. 11 b) united, with 5:5 lateral setae. Setae on scutum and scutellum in Fig. 11 c; DM 14, DL 12:12, PA 6:6, SC 7. Wing (Fig. 11 d) bare, membrane granular, squama bare, anal lobe obtuse. RR 0.61, VR 1.18, R/Cu 1.08. Costa extended much beyond tip of R4+5. Cu2 nearly straight. fLR 0.75, mLR 0.54, hLR 0.61, fTR 0.13, fBR 2.4, mBR 2.4, hBR 2.8. Middle and hind tarsi I and II each with one long terminal spur, a quite unusual structure. Pulvilli absent.

Setae on abdominal tergites in Fig. 11 e, the numbers are 16 on I, 46 on II to IV, 40 on V and VI, and 36 on VII and VIII, all almost evenly distributed. Hypopygium in Fig. 11 f. Anal point absent, ninth tergite with 8 short setae. Virga (Fig. 11 g) small, composed of 4 short codes situated on a cup. Inner lobe of gonocoxite (also in Fig. 11 g, ventral view) composed of a long, low and rounded ridge bearing orally directed short setae, its basal portion darkly pigmented. Apical portion of gonostylus slightly expanded and curved inwards.

Remarks. This specimen is considered as a member of the genus *Bryophaenocladius* Thienemann, 1934, since squamae and eyes are bare, wing membrane is bare and granular, costa extended, antenna with 13 flagellar segments and AR is larger than 1.2. This genus is very rich in the number of species in Europe, and 13 British species are recorded by Pinder (1978). The present species is somewhat related to *B. feminis* (Edwards) in that inner lobe of gonocoxite is single, low, broad and rounded, but all the previously known species have a prominent anal point. On the other hand, 4 species have been recorded from Japan as members of this genus (Sasa & Kikuchi, 1995), but all of them also have anal point. The present species is characteristic in that anal point is absent, inner lobe of gonocoxite is single, low, broad and chitinized, and Cu2 is only slightly curved.

22. *Epoicocladius chuzeundecimus* Sasa, 1984 (Figs. 12 a-n)

Eleven males were collected by sweeping; 3 at Satofure, No.372:22, 23, 32 (#1:21, 22, 23); 4 at Umenoki Dam, No.372:38-41 (#2:14:2-5), on March 27; 1 at Ohshimizu, No.357:76 (#3:17:2), and 3 at Umenoki Dam on March 28, No.357:86-88 (#5:9:2-4). BL 2.38-2.62 (2.49 in average of 10) mm, WL 1.42-1.57 (1.53) mm, WW/WL 0.32-0.33. Scutum, scutellum and postnotum black, abdominal tergites and legs yellowish brown. Head in Fig. 12 a. Eyes bare, reniform, ER 1.36-1.86 (1.51). Antenna with 13 flagellar segments, AR 0.69-0.79 (0.76), AHR

0.38-0.46 (0.44). Palp short, P/H 0.71-0.92 (0.81). SO 3, 4, or 5 (4.4), CL 4, 5 or 6 (5.4). Antepronotum (Fig. 12 b) united, with 1 or 2 (1.5) lateral setae. Setae on scutum and scutellum in Fig. 12 c. DM 0, scutum with a median hole. DL 5 or 6 (5.8), PA 3 or 4 (3.1), SC all 2.

Wing (Fig. 12 d) bare, brownish, squama bare, anal lobe obtuse. Costa extending much beyond tip of R4+5. RR 0.54-0.71 (0.62), VR 1.14-1.21 (1.18), R/Cu 1.00-1.04 (1.02). Cu2 strongly curved. Tip of front tibia (Fig. 12 e) with a long spur, tip of middle tibia (Fig. 12 f) with two short spurs, tip of hind tibia (Figs. 12 g,h) with a long and a short spur, and a comb composed of 10 free spines. fLR 0.55-0.57 (0.56), mLR 0.47-0.49 (0.48), hLR 0.52-0.54 (0.53),, fTR 0.11-0.12, fBR 1.8-3.6 (2.7), mBR 2.3-4.9 (3.7), hBR 2.8-4.6 (4.0). Pulvilli absent.

Setae on abdominal tergites (Fig. 12 i) are relatively small in the numbers, 10 on Ⅰ, 20 on Ⅱ to Ⅴ, and 18 on Ⅵ to Ⅷ. Hypopygium in Fig. 12 j. Anal point (also in Fig. k) roughly rectangular but with rounded apex, basal portion covered by microtrichia. Virga (Fig. 12 m) large, composed of two stout inner codes and two narrower lateral codes situated on a cup. Inner lobe of gonocoxite (Fig. 12 n) large, acutely angulate. Gonostylus apically strongly expanded inwards.

Remarks. The above structurd of the present specimens indicate that they belong to the genus *Epoicocladius* Zavrel, 1924, in the sense of Sasa and Kikuchi (1995, p.190), and are almost in accordance with those of *E. chuzeundecimus* Sasa, 1981, recorded first with two males collected from Lake Chuzenji, Nikko National Park, Tochigi, and later also with 2 males from Jinzu River, Toyama, by Sasa (1990).

***Ikiprimus* gen. nov.**

A new genus is created in order to accept the following new species. It has pubescent eyes, wings bare and smooth, squama bare, R2+3 is in contact with R4+5, and therefore it is similar in character to the species of the *tokuokasia* group of genus *Eukiefferiella* Theinemann, 1926, subfamily Orthocladiinae, but in this species last antennal segment is very short and AR is only 0.13, anal point is robust and entirely clothed in microtrichia, wing vein Cu2 is strongly curved and thus it is considered as belonging to the tribe Metriocnemini, another tribe than Orthocladiini to which *Eukiefferiella* belongs.

23. *Ikiprimus ikiijeus* sp. nov. (Figs. 13 a-k)

A male was collected by sweeping at Satofure on March 27. Holotype. No. 357:08 (#1:8). BL 2.76 mm, WL 1.44 mm, WW/WL 0.31. Thorax, abdomen and legs almost entirely black. Head in Fig. 13 a. Eyes pubescent, reniform, ER 0.92. Antenna with 13 flagellar segments, last segment extremely short, AR 0.13, AHR 0.23. SO 8:8, CL 3. Antepronotum (Fig. 13 b) narrowly united, with 0:1 lateral seta. Setae on scutum and scutellum in Fig. 13 c. DM 12, all minute. DL 10.:10, long and stout. PA 3:3, SC 8.

Wing (Fig. 13 d) bare, squama bare, anal lobe obtuse, costa extending beyond tip of R4+5. R2+3 in contact with R4+5. VR 1.29, R/Cu 1.09. Cu2 conspicuously curved. Tip of front tibia (Fig. 13 e) with a long spur, tip of middle tibia (Fig. 13 f) with two spurs, tip of hind tibia (Figs 13 g,h) with a long and a short spur, and a comb composed of 12 rather

irregularly arranged spines. fLR 0.51, mLR 0.48, hLR 0.58, fTR 0.12, fBR 1.7, mBR 2.8, hBR 3.3. Pulvilli vestigial.

Setae on abdominal tergites (Fig. 13 i) are 16 on Ⅰ, 18 on Ⅱ to Ⅳ, 20 on Ⅴ, and 18 on Ⅵ to Ⅷ. Hypopygium in Fig. 13 j. Anal point (also in Fig. 13 k) robust, widest at base and gradually tapepring towards rounded apex, almost entirely clothed in microtrichia but without setae. Inner lobe of gonocoxite low and rounded, also clothed in microtrichia and without setae. Gonostylus (Fig. 13 m) widest at base and also clothed entirely with microtrichia.

Remarks. This specimen has bare and smooth wings, squama is bare, eyes pubescent, R2+3 is in contact with R4+5, and anal point is present, and thus it is somewhat similar to the species of the *tokuokasia* group of genus *Eukiefferiella* Thienemann, 1926 in the sense of Sasa and Kikuchi (1995, p. 157), but is essentially different from this genus in that vein Cu2 is strongly curved (a character of most spepcies of the tribe Metriocnemini), and is quite unusual in that last segment of antenna is very short and antennal ratio is only 0.13. Therefore, a new genus is created in order to accept this species.

Genus *Ikisecundus* gen. nov.

The following spepcies belongs to the subfamily Orthocladiinae in its basic structure, and is related to the genus *Orthosmittia* Goetghebuer, 1940, in that wing is bare and not granular, Cu2 only slightly curved, R2+3 separated, squama fringed, and pulvilli are absent, but a new genus is created by that in *Orthosmittia* anal point is long, slender and entirely covered by microtrichia (short, wide, triangular and entirely covered by relatively long setae in the present species), and inner lobe of gonocoxite is single (double and the basal one is large, claw-like and apically pointed in the present species). In species of the genus *Orthocladius,* anal point with lateral setae but bare dorsally, and also without such claw-like basal process on gonocoxite. The extremely narrow wing with strongly produced anal lobe is also a remarkable character of this new species. This species has a spine on gonostylus.

24. *Ikisecundus ikijekeus* sp. nov. (Figs. 14 a-g)

A male was collected by sweeping at Umenoki Dam on March 29. Holotype: No.357:29 (#2:5). BL 4.17 mm, WL 2.36 mm, WW/WL 0.26 (very narrow). Scutum, scutellum and postnotum entirely black, abdominal tergites and legs dark brown. Head in Fig. 14 a. Eyes bare, elongate reniform, ER 0.73. Antenna with 13 flagellar segments, AR 2.41 (very high), AHR 0.67. P/H 1.05. SO 12:12, CL 20. Antepronotum (Fig. 14 b) narrowly united, with 6:6 lateral setae. Setae on scutum an scutellum in Fig. 14 c; DM not detectable, DL 12:13, PA 6:6, SC 10.

Wing (Fig. 14 d) bare, membrane smooth, very narrow (WW/WL 0.26), anal lobe is strongly produced inwards (a characteristic of this species), costa slightly produced beyond tip of R4+5. RR 0.44, VR 1.09, R/C 1.11. Cu2 slightly curved near apex. Tip of front tibia with a long spur, tip of middle tibia with two short spurs, tip of hind tibia with a long and a short spur, and a comb composed of 12 spines. fLR 0.73, mLR 0.51, hLR 0.53, fTR 0.13, fBR 2.6, mBR 2.7, hBR 3.2. Small brush-like pulvilli present.

Setae on abdominal tergites (Fig. 14 e, left half) are 56 on Ⅰ, 60 on Ⅱ, 64 on Ⅲ and Ⅳ, 60 on Ⅴ, and 52 on Ⅵ to Ⅷ. Hypopygium in Figs. 14 f,g. Anal point large, roughly rectangular, and with numerous long setae. Virga not detected. Gonocoxite with two inner lobes (Fig. 14 g), the basal lobe is large, claw-like and with pointed apex (a characteristic of this species), and the middle lobe which is broad and rounded. Gonostylus widest at about distal 1/3, apical portion strongly curved inwards, without preapical swelling, and with a triangular spine subapically.

Remarks. This species is differentiated from the previously known members of Chironomidae by the above stated peculiar structures described in creating this new genus.

25. *Limnophyes ikikeleus* sp. nov. (Figs. 15 a-g)

Three males were collected by sweeping; one at Touda Dam on March 28, Holotype, No.357:56 (#8:13). Paratypes, 1 at Satofure, No.357:14 (#1:14);1 at Umenoki Dam on March 27, No.376:01 (#2:7:5). BL 2.30, 2.20, 2.31 mm, WL 1.10, 1.05, 1.28 mm, WW/WL 0.34, 0.33, 0.32. Scutal tripes, postnotum and abdomen brown, scutellum and legs yellow. Head in Fig. 15 a. Eyes bare, reniform, ER 1.36, 1.43. Antenna with only 11 flagellar segments, AR 0.58, 0.58, 0.62, AHR 0.42, 0.40, 0.38. Palp short, P/H 0.78, 0.74, 0.79. SO composed of 1:1 inner and 2:2 lateral setae in all the specimens. CL 18, 14, 16. Antepronotum (Fig. 15 b) united, with 1 upper and 3 or 4 lateral setae. Setae on scutum and scutellum in Fig. 15 c. DM all 0, DL 18:20, 14:14, 24:21, among which 3:3, 2:2, 5:5 in the prescutellar areas are short (30 microns) and lamellar, the rest anterior setae are long and stout (Fig. 15 d). PA 5:7, 5:5, 6:6, SC 8, 6, 6. Wing in Fig. 15 e. Membrane bluish and highly granular. Squama with 4:4, 3:3, 3:3 fringe hairs, anal lobe nearly flat. Costa extending beyond tip of R4+5, Cu2 strongly curved. RR 0.36, 0.30, 0.21, VR 1.32, 1.28, 1.33, R/Cu 1.00, 1.02, 1.05. fLR 0.47, 0.50, 0.51, mLR 0.43, 0.46, 0.46, 0.46, hLR 0.54, 0.56, 0.56, fTR all 0.13, fBR 2.0, 2.2, 2.3, mBR 3.1, 2.3, 3.1, hBR 2.9, 2.5, 2.6.

Setae on abdominal tergites (Fig. 15 f) are relatively small in the numbers, 12 on Ⅰ, 20 on Ⅱ, 22 on Ⅲ, and 24 on Ⅳ to Ⅷ. Hypopygium in Fig. 15 g. Posterior margin of anal tergite with a rounded anal point entirely clothed with microtrichia but without setae. Virga composed of a single code 30 microns long. Gonocoxite with an acutely angulate basal lobe without setae but clothed with microtricia. Gonostylus simple, nearly parallel-sided and without preapical swelling.

Remarks. These specimen also belong to the genus *Limnophyes,* and to the group with lamellar setae on only prescutellar areas, scuh as *L. tamakitanaides,* but differ from it especially in having a rounded anal point without setae and with microtrichia. Body much smaller, AR also smaller and setae on abdominal tergites are fewer than in the previously known species of this group.

26. *Limnophyes ikilemeus* sp. nov. (Figs. 16 a-j)

Two males were collected by sweeping on March 28. Holotype: collelcted at Touda Dam, No.357:51 (#8:8). Paratype: collected at Danjodake Dam, No.357:37 (#6:15:2); unfortunately, wings are mounted in liquid, and head and hind legs are lost. BL 4.98, 4.84 mm, WL 1.73, 1.68 mm, WW/WL 0.29. Scutum with a pair of large humeral pale areas (HP in

Materials and Methods

Collections of adult chironomid midges were conducted by Suzuki during 3 day period from March 27, 1998 on Iki Island, following the 3 day collections on the neighboring island of Tsushima during 3 days from 24 March. Two different methods were used also for the collections, sweeping with insect net during daytime at the side of rivers and streams, and night collections with two light traps equipped with 10 watt black light fluorescent lamp and sucking fun, in two towns. The specimens were preserved in glass vials in 70% ethanol solution, and were individually mounted on slide glasses according to the method recently developed by Suzuki. The wings are cut with fine forceps with squama attached to the body and were mounted dry on a slide glass with a 8 X 24 mm cover glass. The body is then digested in a small test tube containing a few ml of hot alcali solution (10% KOH) for about 15 minutes, washed in water, and dissected with two fine needles in a drop of gum-chloral solution on the same slide glass under a stereomicroscope, into head, two antennae, legs, and antepronotum, with thorax and abdomen are left attached for the convenience of measurement of body length. All the body parts are placed in the same positions by a placing on another slide glass with marks assigned to each part with black marks, and left dry overnight until gum-chloral medium becomes dry and the individual parts become fixed. Then, a 18 mm square coverglass is places with a drop of gum-chloral medium on the dissected specimen. The slide specimens are left in horizontal position at least for a week in room temperature (or a few days in hot chamber) until the cover glass is fixed.

The identification of each specimens are made under a compound microscope by the method described in the monograph of Japanese Chironomidae compiled by Sasa and Kikuchi (1995). Each specimen is usually able to classify to the level of genus or subgenus by examination of wings and male hypopygium under low magnifications, but measurement and examinations of other body parts are usually necessary for the species identification. The nomenclature of individual body parts and the methods of their standard mesurements are as described also in this monograph. The list of species described from Japan, the keys to their identification, the figures of the hypopygium and other necessary portions, and their references are also described in this monograph, and also in a supplement on Chironomidae of Japan compiled by Sasa (1998).

The localities of collection on Iki Island are as follows: #1. Satofure, Katsumoto. #2. Umenoki Dam, Ashibe. #3. Oushimizu, Ashibe. #4. Shinjo-nishifure, Katsumoto. #5. Katsumoto Dam, Katsumoto. #6. Danjodake Dam, Ashibe. #7. Kugiyamafure, Gounoura. #8. Touda Dam, Gounoura. #9. In the town of Katsumoto, with light traps. The data of collection is March 27, 1998, for #1 and #2, and March 28 for #3 to #8, and March 29 for #9.

Results

As the results of these collections, a total of 147 male specimens were prepared as

(0.45). Palp short, P/H 0.71-0.89 (0.81). Supraorbital setae composed of 1 inner and 2, 3 or 4 (3.0) lateral groups. CL 16, 13, 10. Antepronotum (Fig. 17 b) narrowly united in the middle, each with 1 or 2 upper and 3 or 4 lateral setae. Setae on scutum and scutellum in Fig. 17 c. DM all 0, DL 33:32, 28:26, 34:32, very many, among which 4 or 5 in the humeral area (Fig. 17 d) and 7-12 in the prescutellar area (Fig. 17 e) are shorter and slightly lamellar, about 48 microns long and 2 microns wide, the rest setae are long (about 90 microns long) and stout. PA 4-12 (7.9), SC 6-8 (7.3).

Wing (Fig. 17 f) bare, granular. Squama with 3-5 (3.8) fringe hairs. Costa extending much beyond tip of R4+5. Cu2 strongly curved. RR 0.24-0.31 (0.28), VR 1.31-1.41 (1.35), R/Cu 1.04-1.05. fLR 0.49-0.51 (0.50, very small), mLR 0.42-0.46 (0.44), hLR 0.53-0.56 (0.54)), fTR 0.11-0.13 (0.12), fBR 2.2-2.8 (2.5), mBR 2.4-3.4 (2.9, hBR 2.9-5.6 (4.2). Pulvilli very small, brush-like.

Distribution of setae on abdominal tergites as in Fig. 17 g (paratype, left half), the numbers are 18 on Ⅰ, 48 on Ⅱ and Ⅲ, 38 on Ⅳ to Ⅶ, and 28 on Ⅷ. Hypopygium in Fig. 17 h. Anal point absent, ninth tergite with a broad and rounded lobe near posterior margin, bearing marginal setae and thickly clothed with microtrichia (Fig. 17 i). Virga composed of 2 stout codes 28 microns long in the holotype. Inner lobe of gonocoxite small and acutely angulate (Fig. 17 i). Gonostylus (Fig. 17 j) without apical spur and with 4 long setae preapically, basal 2/3 of inner margin strongly expanded, a peculiar character of this group of *Limnophyes*.

Remarks. This spepcies belongs to the group of *Limnophyes* without megaseta on gonostylus, and thus related to *L. gurgicola* (Edwards) and *L. prolongatus* Kieffer among the European spepcies of this genus, and is closer to *L. prolongatus* in that AR is 0.5-0.6, but in the specimens recorded as *L. prolongatus* by Sasa (1988) from Lake Toya, Hokkaido, this species have 13 flagellar segments on antenna, AR is 0.77-0.82, and the numbers of lamellar setae are more numerous, 6-8 in both humeral and prescutellar areas, and are much shorter and wider (22-34 microns long and 3-4 microns wide). Eight species have been recorded from Japan as members of *Limnophyes* without megaseta (Sasa & Kikuchi, 1995), among which the present species is closest to *L. oyabehiematus* Sasa, Kawai et Ueno, 1988, in that foliate setae are absent in humeral areas, anal point absent, and inner lobe of gonocoxite is small and angulate, but in *L. oyabehiematus* antenna with 13 flagellar segments and AR is 0.71 (larger), and lamellar setae on prescutellar areas are shorter (38-40 microns) and wider (4 microns wide). The absence of dorsomedian setae on scutum is another differentiating character from related species.

28. *Limnophyes minimus* (Meigen, 1848) (Figs. 19 a, b)

Three males were collected by sweeping, 1 at Satofure, No.357:11 (#1:11), 1 at Umenoki Dam on March 27, No. 357:35 (#2:7:2), another at Touda Dam on 28 March, 357:53 (#8:10). BL 2.11, 2.20, 1.86 mm, WL 1.22, 1.40, 1.08 mm, WW/WL 0.33 (wings of the other two specimens were mounted in liquid medium and unable to measure width and venation). Thorax almost uniformly dark brown, abdomen and legs brown. Eyes bare, reniform, ER 1.43, 1.56, 1.36. Antenna with 1 or 12 (the second specimen) flagellar segments, AR 0.79,

0.78, 0.67. Palp short, P/H 0.76, 0.83, 0.80. SO composed of 1 inner and 2 or 3 lateral groups. CL 10, 12, 14. Antepronotum narrowly united, with 1 upper and 2 or 3 lateral setae. Setae on scutum and scutellum in Fig. 18 a. DM all 0, DL 12:11, 11:12, 14:15, all simple and not lamellar. PA 7:6, 7.7, 6.6, SC all 6. Wing bare, bluish and highly granular. Costa extended, Cu2 strongly curved. Squama with 4:4, 3:3, 3:3 fringe hairs. RR 0.28, VR 1.29, R/Cu 1.00. fLR 0.49, 0.48, 0.49 (very low), mLR 0.46, 0.48, 0.46 (also very low), hLR 0.57, 0.54, 0.60, fTR 0.12, 0.12, 0.11, fBR 1.8, 2.8, 1.8, mBR 1.8, 3.3, 3.1, hBR 2.0, 3.2, 3.5. Pulvilli absent.

Hypopygium in Fig. 18 b. Anal point absent, posterior lobe of ninth tergite with rounded margin, not bilobed as in *L. tamakitanaides*. Virga conspicuous, composed of two stout codes 42 microns long. Inner lobe of gonocoxite small and acutely angulate. Gonostylus with a broad swelling along inner margin, preapical tooth absent.

Remarks. This is a cosmopolitan species, and can be differentiated from the related species by that antenna with only 11 or 12 segments, dorsolateral scutal setae are small in the numbers and all simple, anal point absent, lobe on ninth tergite is not concave in the middle, virga with a peculiar structure, inner lobe of gonocoxitte is small, narrow and finger-like, and inner margin of gonostylus is broadly expanded.

29. *Limnophyes tamakitanaides* Sasa, 1981 (Figs. 20 a-c)

Four males were collected by sweeping, 3 at Satofure, No. 357:07 (#1:7), 10 (#1:10) and 14 (#1:14), 1 at Umenoki Dam 357:36 (#2:7:3) on March 27, 2 at Touda Dam, No. 357:52 (#8:9), and 2 at Oushimizu, No. 357:70 (#3:11:2), 357:72 (#3:12:3) on March 28. BL 2.30-2.94 (2.71 in avegae of 4) mm, WL 1.49-1.75 (1.58) mm, WW/WL 0.27-0.29 (0.28). Scutum, scutellum, postnotum and hypopygium almost uniformly dark brown, abdomen and legs brown. Eyes bare, reniform, ER 1.32-1.62 (1.46). Antenna with 13 flagellar segments, AR 0.92-1.08 (1.00), AHR 0.51-0.57 (0.54). P/H 0.85-1.00 (0.93). SO composed of 1 inner and 2 or 3 lateral setae, CL 15-20 (17.0, very many). Distribution of setae on scutum and scutellum in Fig. 20 a. DM 6-8 (7.3), DL 20-28 (23.3), among which 8-14 (10.6) in prescutellar areas are short and slightly folliate (35-45 microns long and 4-5 microns wide), the other setae, including those in humeral areas, are all long and stout (Fig. 20 b).

Hypopygium in Fig. 20 c. Ninth tergite without anal point but with two broad lobes connected with a concave posterior margin, bearing some 10 short marginal setae (posterior lobe of ninth tergite is broadly rounded and not concave in the middle in the other related *Limnophyes* species). Virga absent in two specimens and present in two others (No.357:52, 70), composed of 4 codes 20 microns long situated on a cup. Inner lobe of gonocoxite large and roughly rectangular. Gonostylus nearly parallel-sided and apically truncate, without preapical swelling.

Remarks. This species was first recorded from lower reaches of Tama Rive, Tokyo, and later from a wide range of localities in Japan. It is especially characterized by having several to about 10 short and foliate dorsolateral setae only in the prescutellar areas. It was also demonstrated at this time that this species can clearly be differentiated from the related species of *Limnophyes* by that posterior lobe of ninth tergite is not broadly rounded but

concave in the middle.

30. *Metriocnemus ikineous* sp. nov. (Figs. 23 a-i)

A male was collected by sweeping at Satofure on March 27. Holotype: No.357:17 (#1:17). BL 2.62 mm, WL 1.42 mm, WW/WL 0.32. Scutal stripes and postnotum black, other scutal areas, scutellum, abdominal tergites and legs brown. Head in Fig. 23 a. Eyes bare, ER 0.70. Antenna with 13 flagellar segments, AR 0.64, AHR 0.42. Palp short, P/H 0.73. SO 12:12. CL 9. Antepronotum (Fig. 23 b) narrowly separated, with 6:6 lateral setae. Setae on scutum and scutellum in Fig. 23 c; DM 22, DL 18:20, PA 10:10, SC 10, all well developed. Wing (Fig. 23 d) with macrotrichia on almost entire surface, SQ 6:6, anal lobe obtuse. R2+3 in contact with R4+5, VR 1.26. Tip of R4+5 much proximal to tip of Cul, R/Cu 0.84. Cu2 nearly straight. Tip of front tibia with a long spur, tip of middle tibia with two short spurs, tip of hind tibia with a long and a short spur, and a comb composed of 8 simple spines. Tarsi Ⅰ and Ⅱ of middle and hind tibiae without terminal spur. Pulvilli absent (Fig. 23 e, middle tarsus Ⅴ). fLR 0.75, mLR 0.50, hLR 0.68, fTR 0.20 (very high), fBR 4.3, hBR 3.7.

Setae on abdominal tergites (Fig. 23 f) are 28 on Ⅰ, 40 on Ⅱ, 42 on Ⅲ, 50 on Ⅳ, 52 on Ⅴ, and 60 on Ⅵ to Ⅷ. Hypopygium in Fig. 23 g. Anal point (also in Fig. 23 h) very long and narrow, widest at base and tapering towards apex, entirely clothed with microtrichia. Ninth tergite with a lobe in the middle of posterior margin. Virga not detected. Inner lobe of gonocoxite in Fig. 23 i, gonostylus in Fig. 23 j, the former broad and rounded, gonostylus without preapical tooth.

Remarks. This species belongs to the genus *Metriocnemus* van der Wulp, 1874, since wing membrane with macrotrichia, squama fringed, gonostylus is not bifurcate, eyes bare, vein Cu2 nearly straight, and costa is extended beyond tip of R4+5. It is somewhat related among the European species of this genus to *M. cavicola* Kieffer in that entire wing membrane is densely clothed with macritrichia, gonocoxite with pronounced inner lobe, and AR is relatively small, but in *M. cavicola* AR is about 1.0 and larger, and anal point is smaller. Among the species of this genus recorded from Japan, it is most closely related to *M. ryutanus* Sasa et Hasegawa, 1988, in that long anal point is present, scutellum with only 10 setae, all tarsi without terminal spurs, and tip of R4+5 is situated proximal to tip of Cul, but in *M. ryutanus* anal point is abruptly constricted at about distal 1/3 and the distal portion is bare and apically rounded, gonostylus with a prominent subapical swelling, AR is 0.94 and larger, and ER is 0.58 and smaller.

31. *Metriocnemus ryutanus* Sasa et Hasegawa, 1988 (Figs. 24 a-h)

A male was collected with a light trap at Ikishimaso on March 29. No.357:63 (#9:2). BL 2.76 mm, WL 1.61 mm, WW/WL 0.29. Scutum and postnotum dark brown, scutellum, abdomen and legs brown. Head in Fig. 24 a. Eyes bare, each with a large dorsomedial extension, ER 0.58. Palp with 13 flagellar segments, AR 0.82, AHR 0.44. Palp long, P/H 1.12. SO 16:16, CL 12. Antepronotum (Fig. 34 b) united, with 6:6 lateral setae. Setae on scutum and scutellum in Fig. 24 c; DM 27, DL 22:24, PA 8:10, SC 10. Wing (Fig. 24 d) with macrotrichia on almost entire surface, squama with 26:27 fringe hairs, anal lobe obtuse. Vein R2+3 in contact with R4+5, VR 1.23, tip of R4+5 much proximal to tip of Cul, R/Cu 0.85. Cu2

nearly straight. fLR 0.78, mLR 0.52, hLR 0.69, fTR 0.14, fBR 2.7, mBR 2.7, hBR 3.4. Pulvilli absent (Fig. 24 e, middle tarsus V).

Setae on abdominal tergites (Fig. 24 f, right half) are relatively large in the numbers and distributed almost evenly, 40 on Ⅰ, 60 in Ⅱ and Ⅲ, 64 on Ⅳ, and 68 on Ⅴ to Ⅷ. Hypopygium in Figs. 24 g,h. Anal point widest and base and constricted near apex, apical portion bare, basal 4/5 entirely covered by microtrichia and with 4 pairs of short lateral setae. Virga absent. Inner lobe of gonocoxite large, roughly rectangular. Gonostylus with a small rectangular preapical tooth.

Remarks. This specimen is considered as belonging to *M. rhytanus* Sasa et Hasegawa, 1988, which was described with a single male holotype collected in Okinawa, and later recorded also by Sasa and Okazawa (1992) with another male collected at Toga, Toyama.

32. *Smittia aterrima* (Meigen, 1818) (Fig. 22a)

Twenty six (26) males were collected and identified; 1 at Satofure, No.357:12 (#1:12); 1 at Umenoki Dam, No.357:30 (#2:6) on March 27; 1 at Kugiyamafure, No.357:40 (7:11:2), on March 28, all by sweeping; 5 males at Ikishimaso with light traps on March 28, No.357:46-50 (#9:4:3,4, 5:2-4); 13 by sweeping at Danjodake Dam on 28 March, No.357:89-91 (#6:15:5-7), No.376:11-20 (#6:15:5-14). BL 2.64-3.34 (2.99 in average of 16) mm, WL 1.56-2.04 (1.80)) mm, WW/WL 0.28-0.31 (0.30). Scutum and postnotum dark brown, scutellum, abdomen and legs yellowish brown. Eyes pubescent, ER 1.24-1.31 (1.28). Antenna with 13 flagellar segments, AR 1.72-2.02 (1.87), AHR 0.57-0.62 (0.60), last segment with an apical seta. Palp short, P/H 0.0.87-0.96 (0.91). SO 8-12 (10.), the numbers larger than in *S. pratora* and distributed continuously. CL 8-12 (10.6). Antepronotum united, with 1-3 (1.8) lateral setae. DM 12-20 (10.4), DL 9-17 (12.6), PA 3-5 (4.0), SC 6-10 (8.2). Wing bare, brownish, very finely granular. Squama bare, anal lobe obtuse, costa extended beyond tip of R4+5, Cu2 strongly curved. RR 0.41-0.54 (0.45), VR 1.26-1.37 (1.31), R/Cu 1.03-1.09 (1.06). fLR 0.55-0.57 (0.56), mLR 0.48-0.50 (0.49), hLR 0.57-0.60 (0.59), fTR 0.11-0.12, fBR 2.3-3.7 (3.0), mBR 3.2-5.4 (4.3), hBR 3.8-6.5 (5.2). Middle and hind tarsi Ⅰ and Ⅱ without terminal spurs. Pulvilli absent.

Hypopygium in Fig. 22 a. Anal point much shorter than in *S. pratora,* microtrichia extending to near tip. Small virga present, composed of 4 short codes situated on a cup. Inner lobe of gonocoxite small, narrow and rounded. Inner margin of gonostylus broadly expanded.

Remarks. This is a species with cosmopolitan distribution, and has been collected also from a large number of localities in Japan (Sasa & Kikuchi, 1995). It is characterised by that eyes are reniform and pubescent, AR is relatively high (>1.7), SO is 10 or more, DL also 10 or more, SC 7-10, anal point is relatively short and almost entirely covered by microtrichia, virga is small and composed of short codes situated on a cup, inner lobe of gonocoxite is small and rounded, and gonostylus has an inner swelling extending along distal half of inner margin.

33. *Smittia itachipennis* Sasa et Kawai, 1987 (Figs. 18 a-e)

Two males were collected by sweeping at Oushimizu on March 28. No.357:71, 74 (#3:12:2, 5). BL 2.68, 2.39 mm, WL 1.44, 1.39 mm, WW/WL 0.31, 0.30. Scutum and

postnotum dark brown, scutellum, abdomen and legs brown. Head in Fig. 18 a. Eyes pubescent (a differentiating character from *S. pratora*), ER 1.31, 1.32. Antenna with 13 flagellar segments, AR 1.39, 1.23 (smaller than the other two species of *Smittia*), AHR 0.58, 0.60, last segment with an apical seta. P/H 0.96, 0.88. SO 4:4, 3:3, all situated laterally. CL 9, 8. Antepronotum (Fig. 18 b) united, each with 1 lateral seta. Setae on scutum and scutellum in Fig. 18 c; DM 7, 4, all minute, DL 13:13, 10:10, PA 7:7, 4:5, SC 8, 6. Wing (Fig. 18 d) venation typical as a member of *Smittia,* squama bare, Cu2 strongly curved, costa extended much beyond tip of R4+5, RR 0.25, 0.36, VR 1.33, 1.30, R/Cu 1.05, 1.03. fLR 0.53, 0.54, mLR 0.47, 0.44, hLR 0.58, 0.60, fTR 0.11, 0.12, fBR 3.5, 3.2, mBR 4.9, 4.0, hBR 8.5, 4.8.

Hypopygium in Fig. 18 e (No.357:71). Anal point long and stout, almost entirely bare. Virga absent. Inner lobe of gonocoxite large, rectangular, with a ridge along posterior margin. Gonostylus with a low rectangular preapical tooth and slightly expanded in the distal half.

Remarks. From the above described structures and measurement data, these specimens are provisionally identified as *S. itachipennis* Sasa et Kawai, 1987, recorded only once from Toyama. The variation especially in the structure of inner lobe of gonocoxite needs to be studied with additional materials.

34. *Smittia pratora* (Goetghebuer, 1926) (Fig. 21 a)

Three males were collected by sweeping; 1 at Satofure on March 27, No.357:09 (#1:9); 2 at Oushimizu, No.357:72,73 (#3:12:3,4) on March 28. BL 2.50, 2.44, 2.56 mm, WL 1.57, 1.50, 1.55 mm, WW/WL all 0.31. Scutum, scutellum and postnotum black, abdominal tergites and legs dark brown. Eyes bare (an important character for differentiating from related species), reniform, ER 1.38, 1.31, 1.26. Antenna with 13 flagellar segmentts, AR 1.74, 1.63, 1.71, AHR 0.65, 0.54, 0.52, last segment with an apical seta. P/H 0.94, 0.94. Antepronotum united, all with one short lateral seta. Supraorbital setae composed of 1 inner and 2 or 3 lateral groups (smaller in numbers than in *S. aterrima).* CL 4, 6, 8. DM 10, 7, 10, all minute, DL 10:10, 14:14, 13:12, PA 5:5, 8:8, 4:5, SC all 8. Wing bare, brownish, very finely granular, squama bare, anal lobe obtuse, costa extended much beyond tip of R4+5, Cu2 strongly curved at about middle. RR 0.28, 0.30, 0.33, VR 1.32, 1.29, 1.36, R/Cu 1.04, 1.05, 1.01. fLR 0.57, 0.56, 0.59, mLR 0.43, 0.43, 0.44 (very small), hLR 0.58, 0.57, 0.57, fTR 0.12, 0.12, 0.11, fBR 3.2, 3.3, long setae on middle and hind tibiae all lost. Pulvilli vestigial.

Hypopygium in Fig. 21 a. Anal point long, narrow, widest at base and apically rounded, without lateral setae, and without microtrichia except on the basal portion. Virga small, composed of 8 short codes 15 microns long. Inner lobe of gonocoxite broad and rounded, with a few short setae on inner margin, and inner half clothed with microtrichia. Gonostylus broadly and strongly expanded along inner margin, without preapical swelling.

Remarks. This is a cosmopolitan species and has been recorded by Sasa and Hasegawa (1988) from Okinawa Islands, and by Sasa, Watanabe and Arakawa (1992) from Toga, a mountain region in Toyama. The male can be differentiated from the related species of this genus by that eyes are bare, anal point is long and largely bare, inner lobe of

gonocoxite is broad and rounded, and inner margin of gonostylus is broadly rounded.

35. *Toyamayusurika shiotanii* Sasa et Kawai, 1987

A male was collected by sweeping on March 28, at Kugiyamafure. No.357:32 (#7:12:2). This specimen is partly damaged but hypopygium is complete.

36. *Thienemanniella vittata* (Edwards, 1924)

A male was collected by sweeping at Satofure on March 27. No.357:16 (#1:16). BL 1.96 mm, WL 1.24 mm, WW/WL 0.37 (very wide). Eyes pubescent, reniform, ER 1.41. Antenna with 12 flagellar segments, AR 0.60, AHR 0.44. P/H 0.86. SO 0:0, CL 14. DM 0, DL 11:11, PA 3:3, SC 2. Squama bare, wing venation peculiar as in Corynoneurini. Tip of hind tibia not expanded. fLR 0.67, mLR 0.66, hLR 0.67, fTR 0.12,fBR 3.0, mBR 3.2, hBR 2.9. Structures as described by Sasa and Kawai (1987) with specimens collected from Lake Biwa.

37. *Eukiefferiella ikiopeus* sp. nov. (Figs. 25 a-h)

After the above descriptions were completed, two specimens of this new species were collected from a preserved sample collected by sweeping at Umenoki Dam on March 27. Holotype: No.372:89 (#2:5:2). Paratype: No.372:90 (#2:5:3). BL 3.42, 3.38 mm, WL 1.94, 2.00 mm, WW/WL 0.29, 0.26. Scutum and postnotum almost uniformly brown, scutellum, abdomen and legs brownish yellow. Head in Fig. 25 a. Eyes bare, ER 1.00, 1.00. AR 1.73, 1.71, AHR 0.59, 0.56. P/H 1.11, 0.97. SO 8:8, 7:7, CL 8, 6. Antepronotum (Fig. 25 b) united, with 1:1, 1:1 lateral seta. Setae on scutum and scutellum in Fig. 25 c; DM 0,0, DL 5:5, 6:6, PA all 3, SC 6, 4.

Wing (Fig. 25 d) bare, brownish, only slightly granular. Squama with 8-12 (10.2) fringe hairs. Costa not extended, Cu2 nearly straight. R2+3 separated, RR 0.33, 0.25. VR 1.08, 1.07, R/Cu 1.11, 1.06. Tip of front tibia with a long spur, tip of middle tibiae with 2 short spurs, tip of hind tibia with a long and a short spur, and a comb composed of 8 free spines. Trarsi I and II of middle and hind tibiae without terminal spur. fLR 0.70, 0.73, mLR 0.52, 0.52, hLR 0.68, fTR 0.11, 0.10, fBR 1.8, 1.6. Pulvilli absent.

Hypopygium in Fig. 25 e. Anal point absent, ninth tergite with a broad and rounded lobe near posterior margin, bearing 8 marginal setae. Virga (Fig. 25 f) composed of 6 codes 33 microns long situated on a cup. Gonocoxite with two inner lobes (Fig. 25 g), the dorsal one small and rounded, the ventral one long, broad and very low. Gonostylus (Fig. 25 h) simple, widest at about distal 1/3, without preapical swelling.

Remarks. This species is considered as belonging to the genus *Eukiefferiella* Thienemann, 1926, since wings are bare and not granular, gonostylus simple, squama fringed, eyes bare, wing vein Cu2 is nearly straight, pulvilli absent, and anal point is absent (cf. Pinder, 1978, p.52). It further belongs to the *chuzeoctava* group of this genus as defined by Sasa and Kikuchi (1995, p.157) in that R2+3 is separated, R/Cu >1.0, squama fringed and eyes are bare, and anal point is absent. Therefore, this species is somewhat related to *E. fujisexta* Sasa, 1993 and *E. jintuquinta* Sasa, 1990, in that pulvilli absent, AR>1.3, tarsi without terminal spurs, tip of R4+5 distal to tip of Cul, and ninth tergite with a broad and rounded lobe, but AR is about 1.7 and between the values of 2.08 of *E. fujisexta* and 1.32 of *E. jintuquinta,* DM is 0, 6 in the former and 10 in the latter), lateral setae of antepronotum

are only 1:1 (5:5 in both species), and the shape of gonostylus is different from both species.

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All the references to taxonomy and identification of adult males of Chironomidae recorded from Japan are listed in the two following monographs.

1) Sasa, M. & Kikuchi, M. (1995): Chironomidae of Japan, 333 pp. Univ. Tokyo Press
2) Sasa, M. (1998): Chironomidae of Japan 1998, 156 pp. Res. Rep. Inst. Environ. & Welf. Stud. Kurobe
A monograph on the adult males of Chironomidae and their references are compiled in the following book.
3) Wiederholm, T. (Ed. 1989): Chironomidae of the Holarctic Region. Keys and Diagnoses. Entomologica Scandinavica. Suppl. 34, 532 pp.
An especially useful keys and illustrations are given in the following book.
4) Pinder, L.C.V. (1978): A key to adult males of British Chironomidae. Freshwater Biol. Assoc., Windermere, England
Two preceding reports on the Chironomidae of Tsushima and Iki Islands are published in the following papers.
5) Sasa, M. & Suzuki, H. (1999a): Studies on the Chironomid midges of Tsushima and Iki Islands, western Japan. Part 1. Species of Chironominae collected on Tsushima. Trop. Med. 41 (1):1-53
6) Sasa, M. & Suzuki, H. (1999b): do, Part 2. Species of Orthocladiinae and Tanypodinae collected on Tsushima. Trop. Med. 41 (2):75-132

Table 1. List of chironomid species collected on Iki Island, March 1998

Species name	Number collected	Figure No.
1. *Chironomus nipponensis* Tokunaga, 1940	(1)	
2. *Dicrotendipes lobiger* (Kieffer, 1921)	(8)	
3. *Paratendipes tamayubai* Sasa, 1983	(2)	Fig. 1
4. *Polypedilum nubifer* (Skuse, 1889)	(1)	
5. *Polypedilum nubeculosum* (Meigen, 1804)	(1)	
6. *Stenochironomus ikiabeus* sp. nov.	(3)	Fig. 2
7. *Stictochironomus histrio* (Fabricius, 1794)	(1)	
8. *Cladotanytarsus tusimajekeus* Sasa et Suzuki, 1999	(4)	Fig. 3
9. *Tanytarsus ikicedeus* sp. nov.	(3)	Fig. 4
10. *Tanytarsus ikideeus* sp. nov.	(43)	Fig. 5
11. *Tanytarsus ikiefeus* sp. nov.	(2)	Fig. 6
12. *Tanytarsus ikifegeus* sp. nov.	(3)	Fig. 7
13. *Tanytarsus oyaberotundus* Sasa, Kawai et Ueno, 1988	(1)	Fig. 8
14. *Tanytarsus tsutaprimus* Sasa, 1991	(1)	Fig. 9
15. *Tanytarsus yunosecundus* Sasa, 1984	(1)	
16. *Cricotopus bicinctus* (Meigen, 1818)	(1)	
17. *Cricotopus ikigeheus* sp. nov.	(1)	Fig. 10
18. *Paratrichocladius refiventris* (Meigen, 1830)	(1)	
19. *Eukiefferiella coerulescens* (Kieffer, 1926)	(8)	
20. *Orthocladius chuzeseptimus* Sasa, 1984	(5)	
21. *Bryophaenocladius ikiheius* sp. nov.	(1)	Fig. 11
22. *Epoicocladius chuzeundecimus* Sasa, 1984	(11)	Fig. 12
23. *Ikiprimus ikiijeus* sp. nov.	(1)	Fig. 13
24. *Ikisecundus ikijekeus* sp. nov.	(1)	Fig. 14
25. *Limnophyes ikikeleus* sp. nov.	(2)	Fig. 15
26. *Limnophyes ikilemeus* sp. nov.	(2)	Fig. 16
27. *Limnophyes ikimeneus* sp. nov.	(3)	Fig. 17
28. *Limnophyes minimus* (Meigen, 1818)	(3)	Fig. 19
29. *Limnophyes tamakitanaides* Sasa, 1981	(5)	Fig. 20
30. *Metriocnemus ikineous* sp. nov.	(1)	Fig. 23
31. *Metriocnemus ryutanus* Sasa et Hasegawa, 1988	(1)	Fig. 24
32. *Smittia aterrima* (Meign, 1818)	(16)	Fig. 22
33. *Smittia itachipennis* Sasa et Kawai, 1987	(2)	Fig. 18
34. *Smittia pratora* (Goetchebuer, 1926)	(3)	Fig. 21
35. *Toyamayusurika shiotanii* Sasa et Kawai, 1987	(1)	
36. *Thienemanniella vittata* (Edwards, 1924)	(1)	
37. *Eukifferiella ikiopea* sp. nov.	(2)	Fig. 25

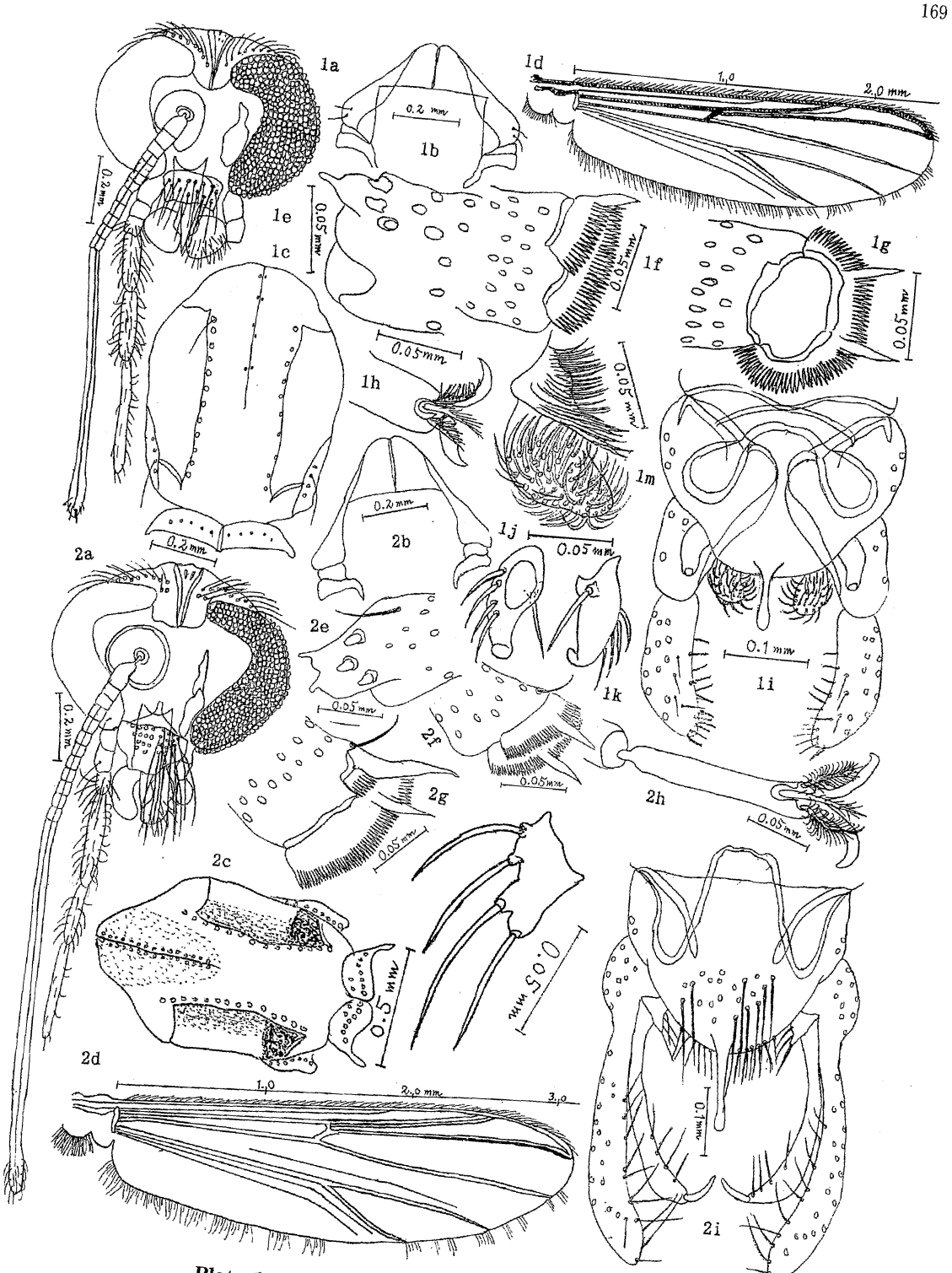

Plate 1. Fig. 1. *Paratendipes tamayubai* Sasa, 1983
Fig. 2. *Stenochironomus ikiabeus* sp. nov.

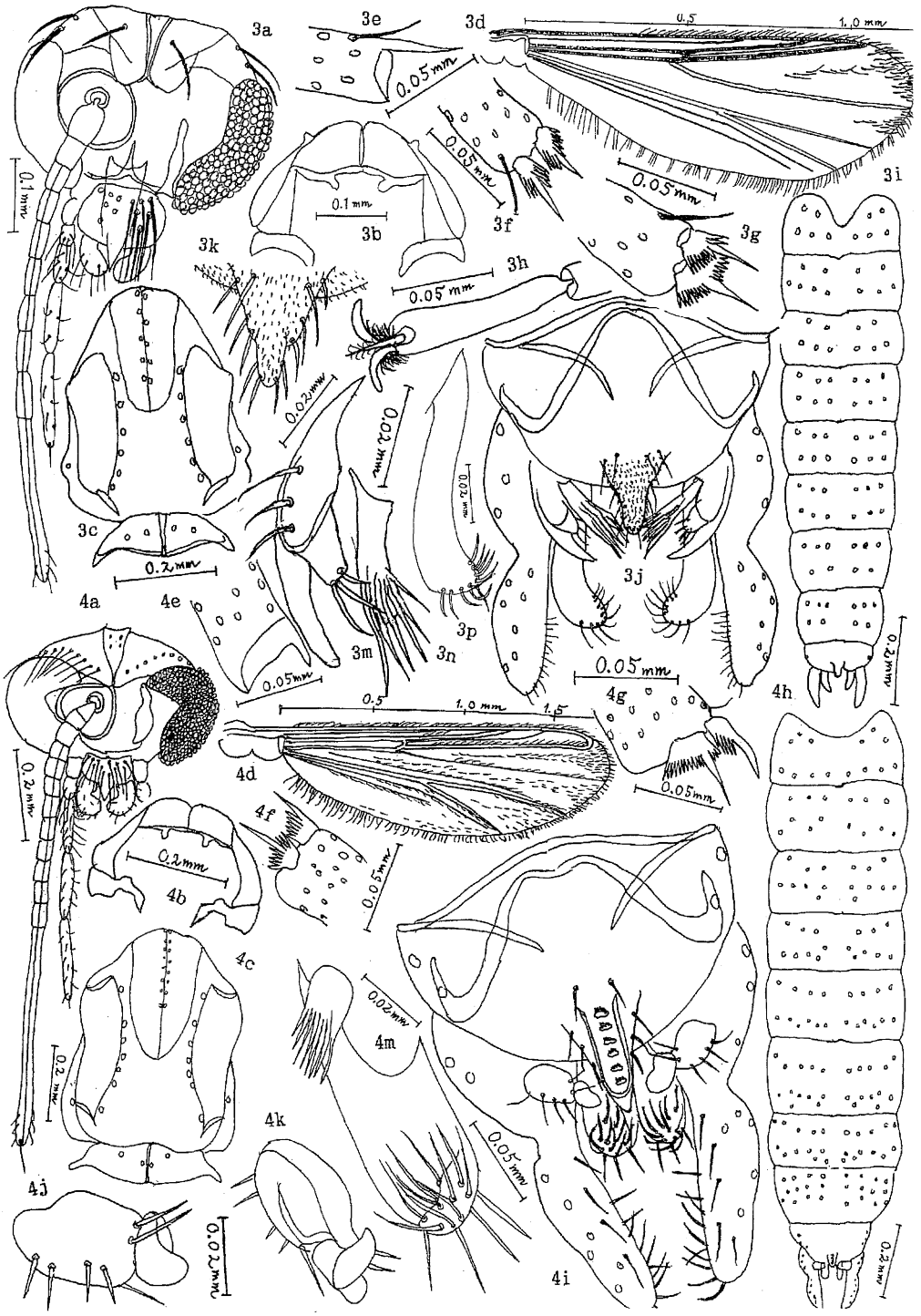

Plate 2. Fig. 3. *Cladotanytarsus tusimajekeus* Sasa et Suzuki, 1999
Fig. 4. *Tanytsarsus ikicedeus* sp. nov.

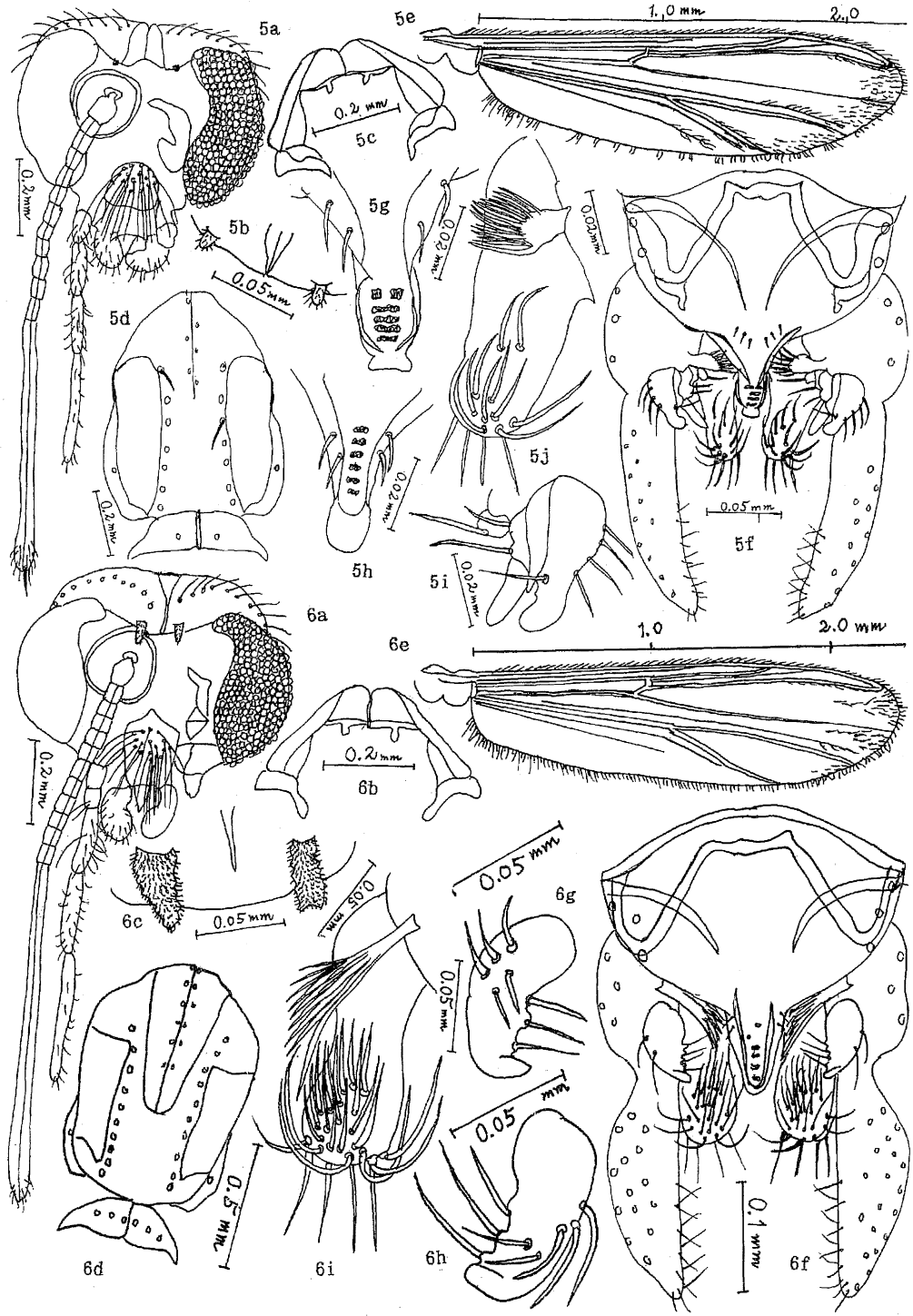

Plate 3. Fig. 5. *Tanytarsus ikideeus* sp. nov.
Fig. 6. *Tanytarsus ikiefeus* sp. nov.

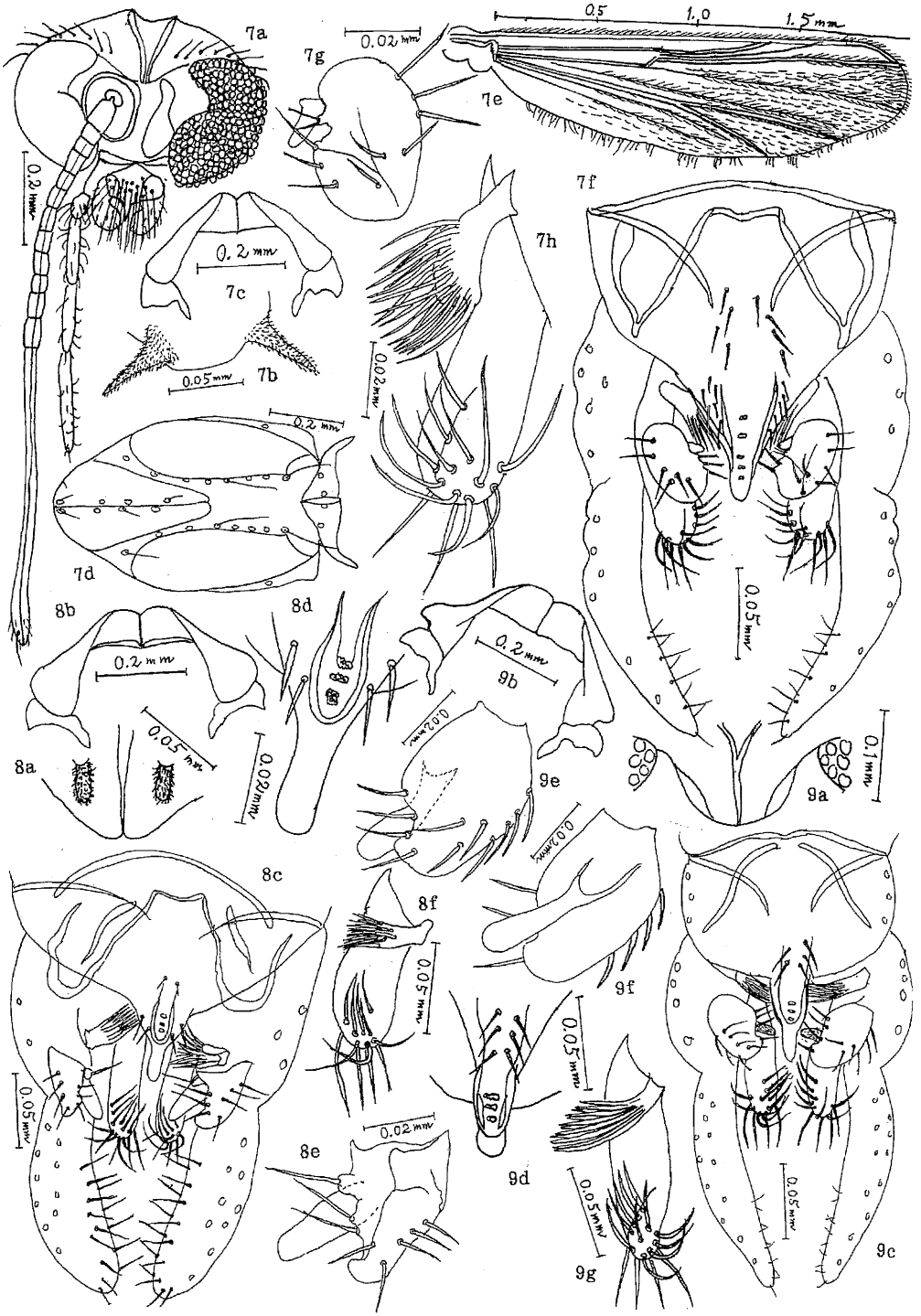

Plate 4. Fig. 7. *Tanytarsus ikifegeus* sp. nov.
Fig. 8. *Tanytarsus oyaberotundus* Sasa, Kawai et Ueno, 1988
Fig. 9. *Tanytarsus tsutaprimus* Sasa, 1991

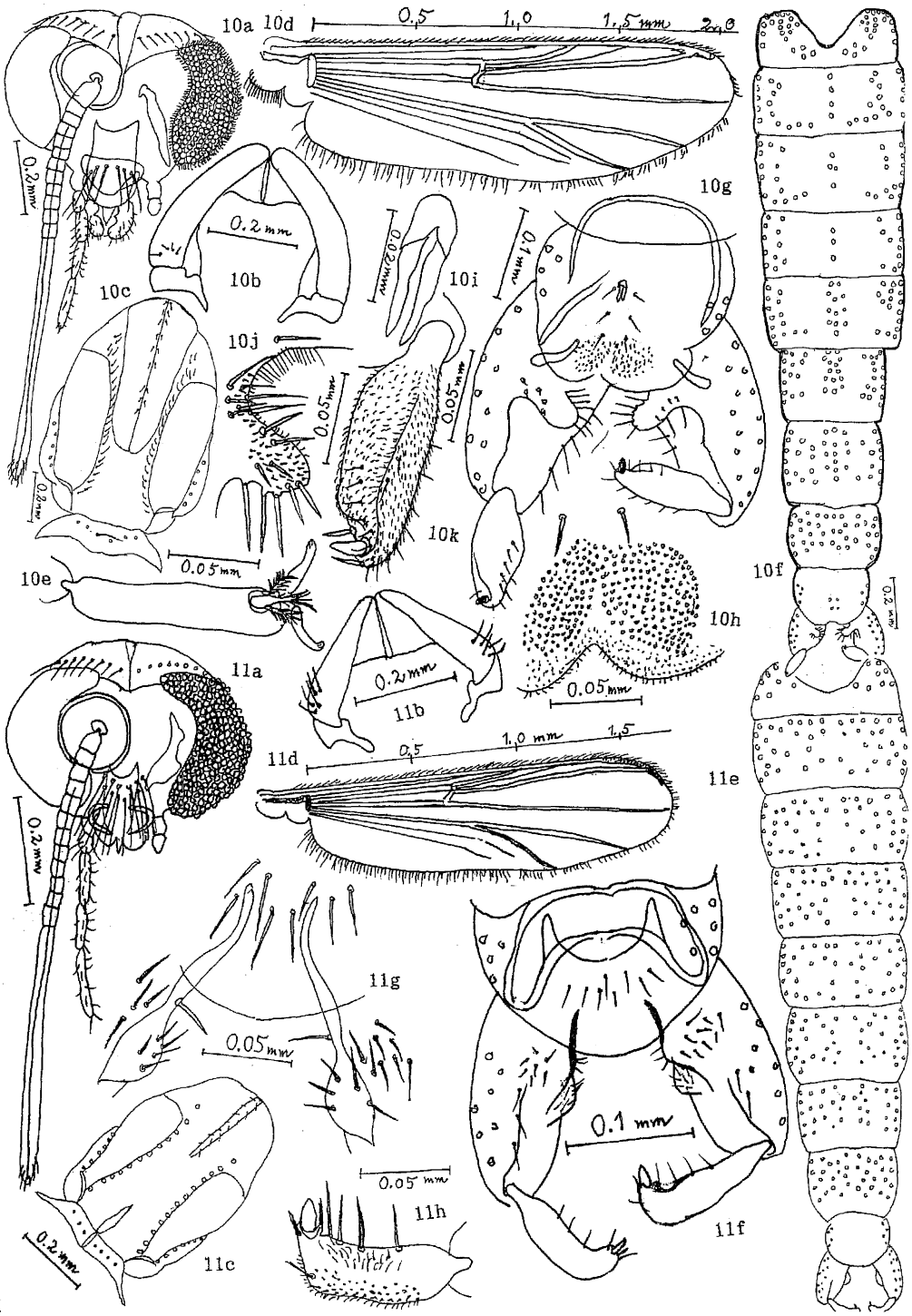

Plate 5. Fig. 10. *Cricotopus ikigeheus* sp. nov.
Fig. 11. *Bryophaenocladius ikiheius* sp. nov.

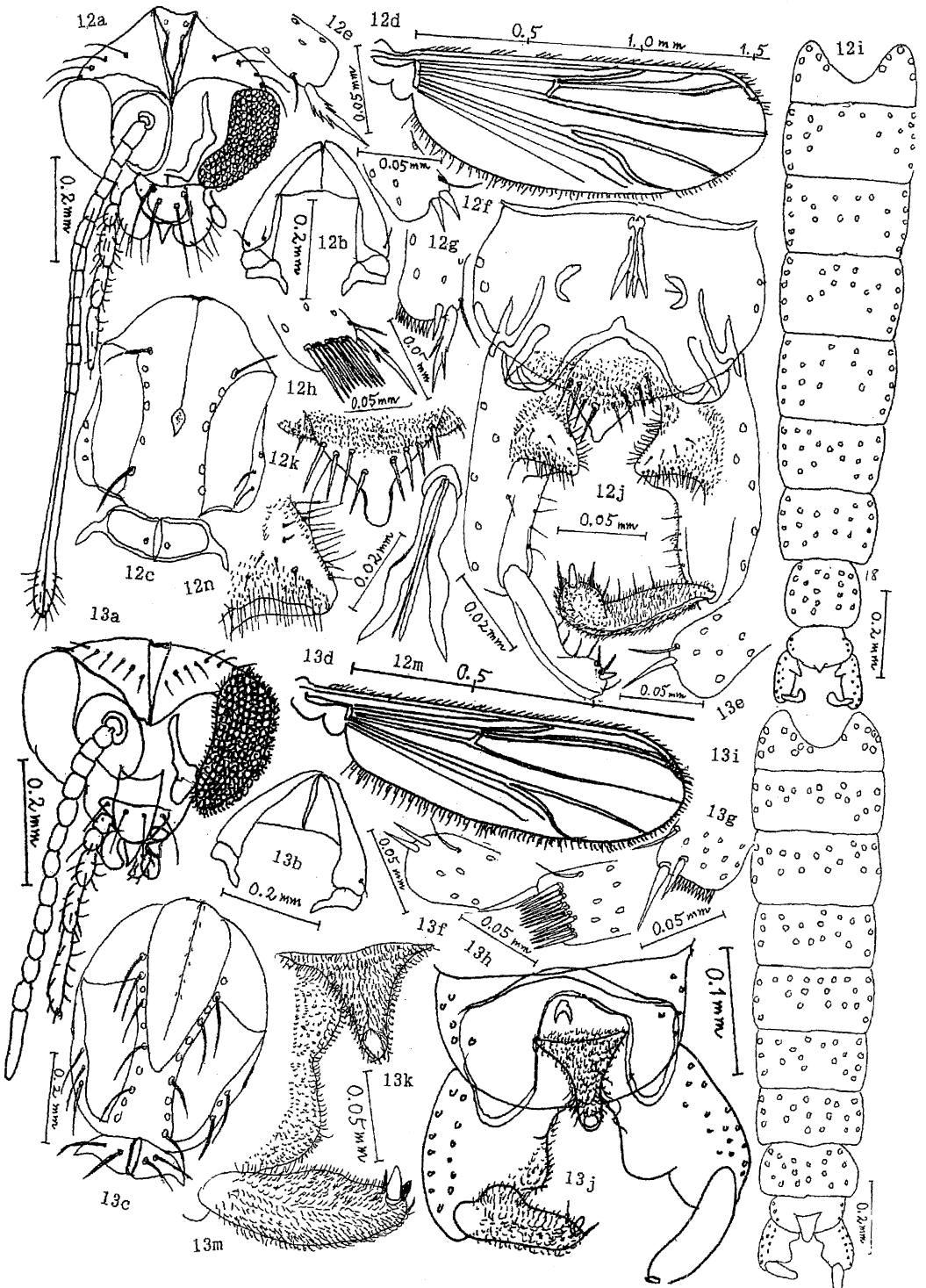

Plate 6. Fig. 12. *Epoicocladius chuzeundecimus* Sasa, 1984
Fig. 13. *Ikiprimus ikiijeus* gen. et sp. nov.

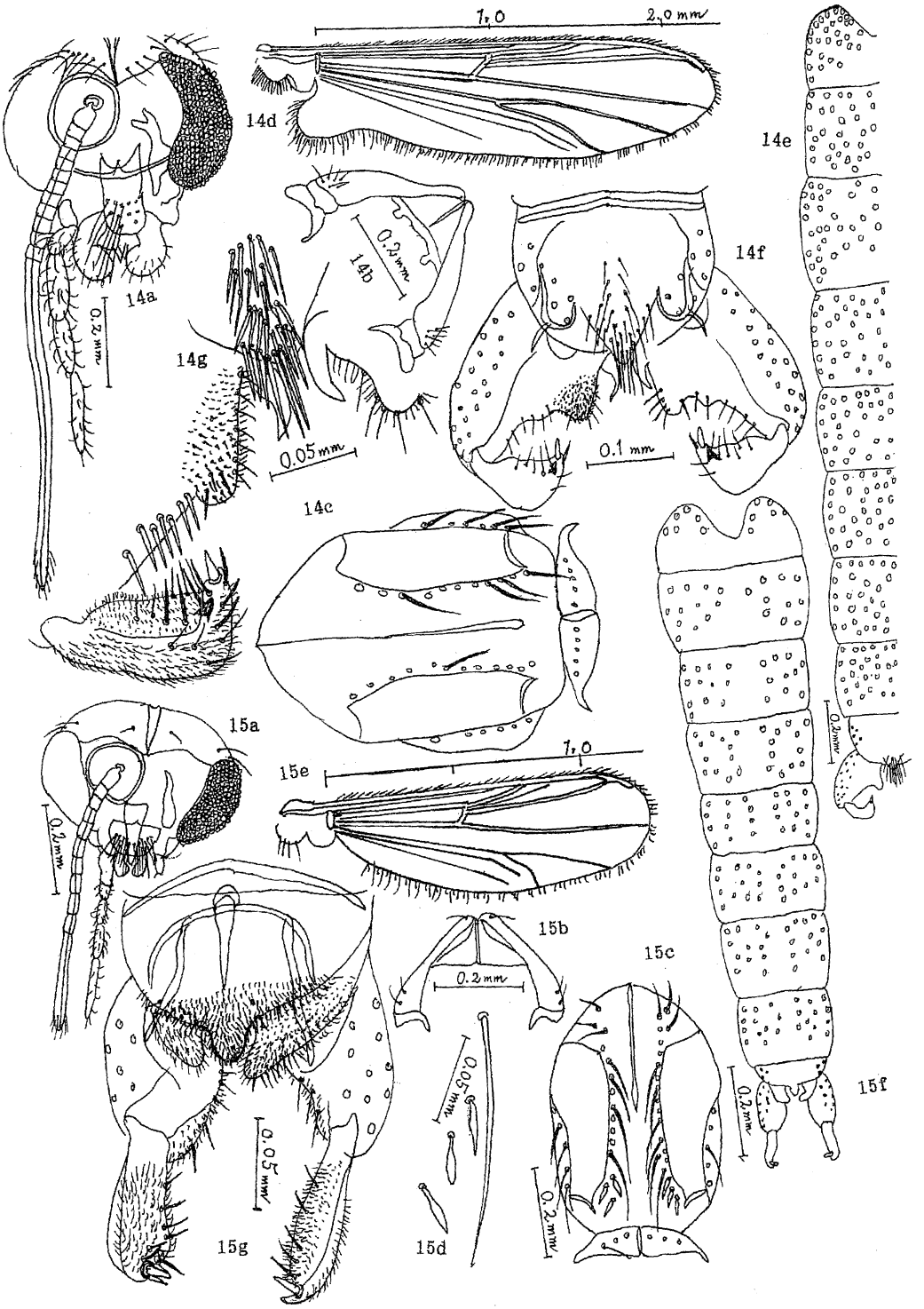

Plate 7. Fig. 14. *Ikisecundus ikijekeus* gen. et sp. nov.
Fig. 15. *Limnophyes ikikeleus* sp. nov.

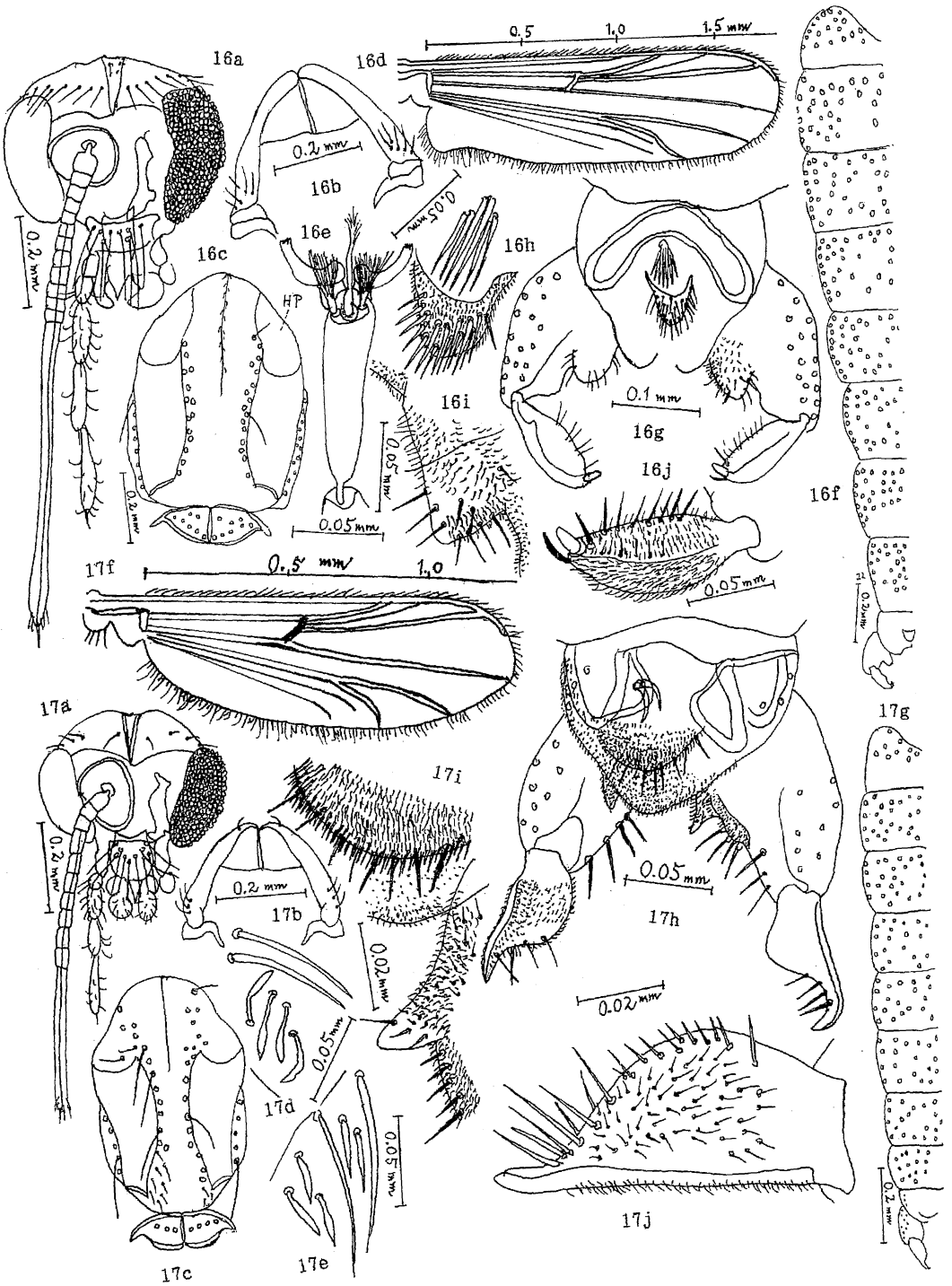

Plate 8. Fig. 16. *Limnophyes ikilemeus* sp. nov.
Fig. 17. *Limnophyes ikimeneus* sp. nov.

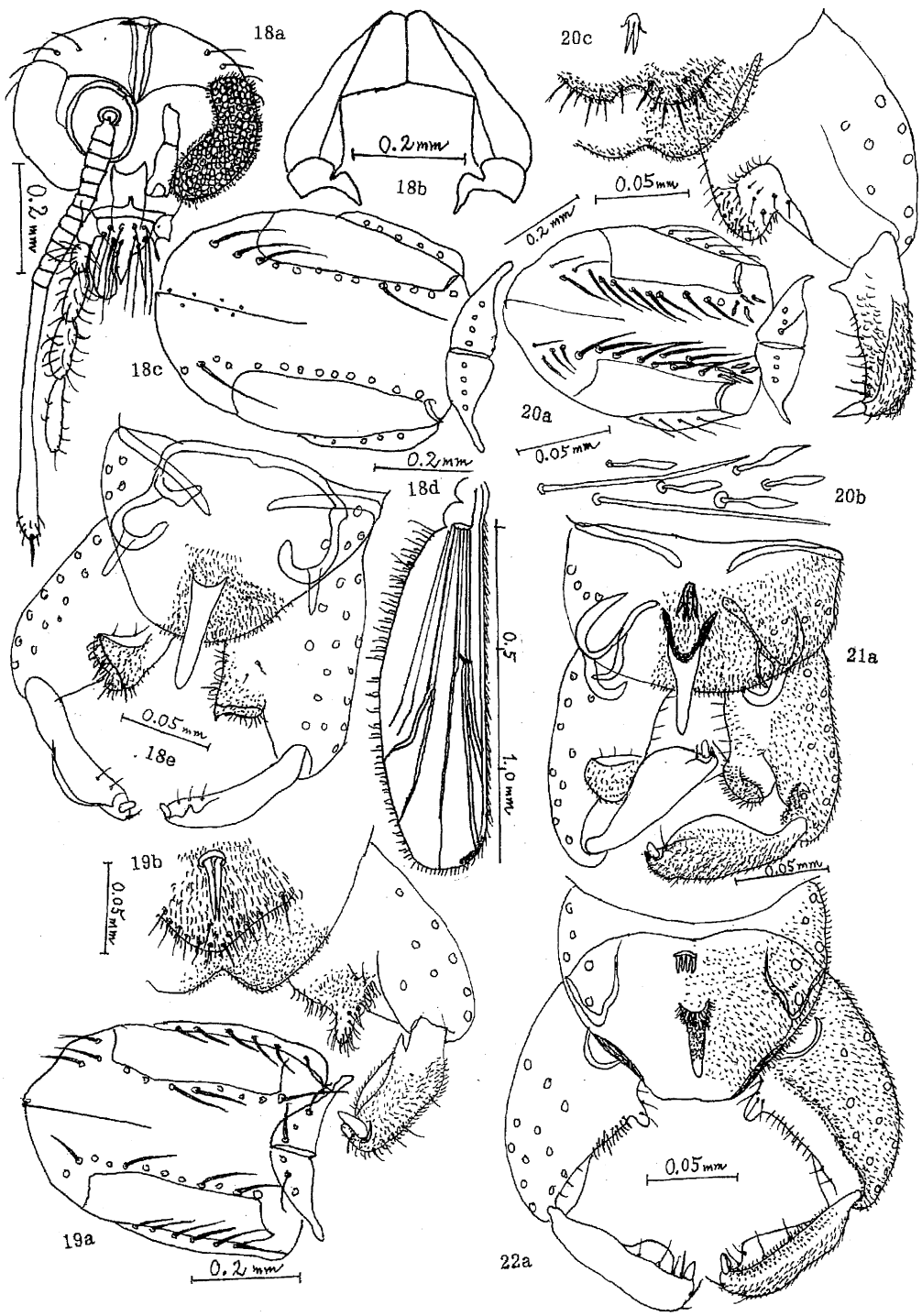

Plate 9. Fig. 18. *Smittia itachipennis* Sasa et Kawai, 1987
Fig. 19. *Limnophyes minimus* (Meigen, 1818)
Fig. 20. *Limnophyes tamakitanaides* Sasa, 1981
Fig. 21. *Smittia pratora* (Goetghebuer, 1926)
Fig. 22. *Smittia aterrima* (Meigen, 1818)

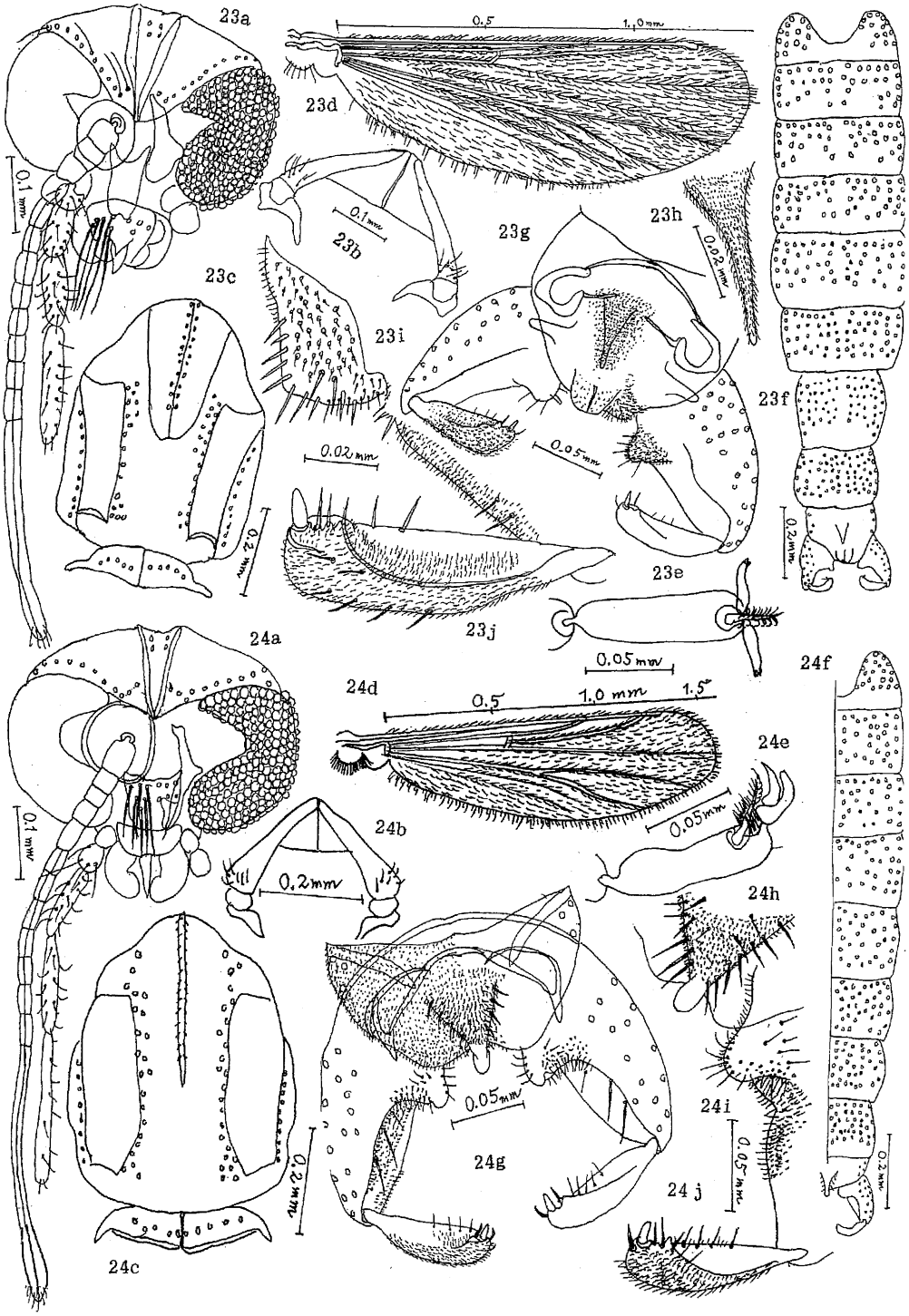

Plate 10. Fig. 23. *Metriocnemus ikineous* sp. nov.
Fig. 24. *Metriocnemus ryutanus* Sasa et hasegawa, 1988

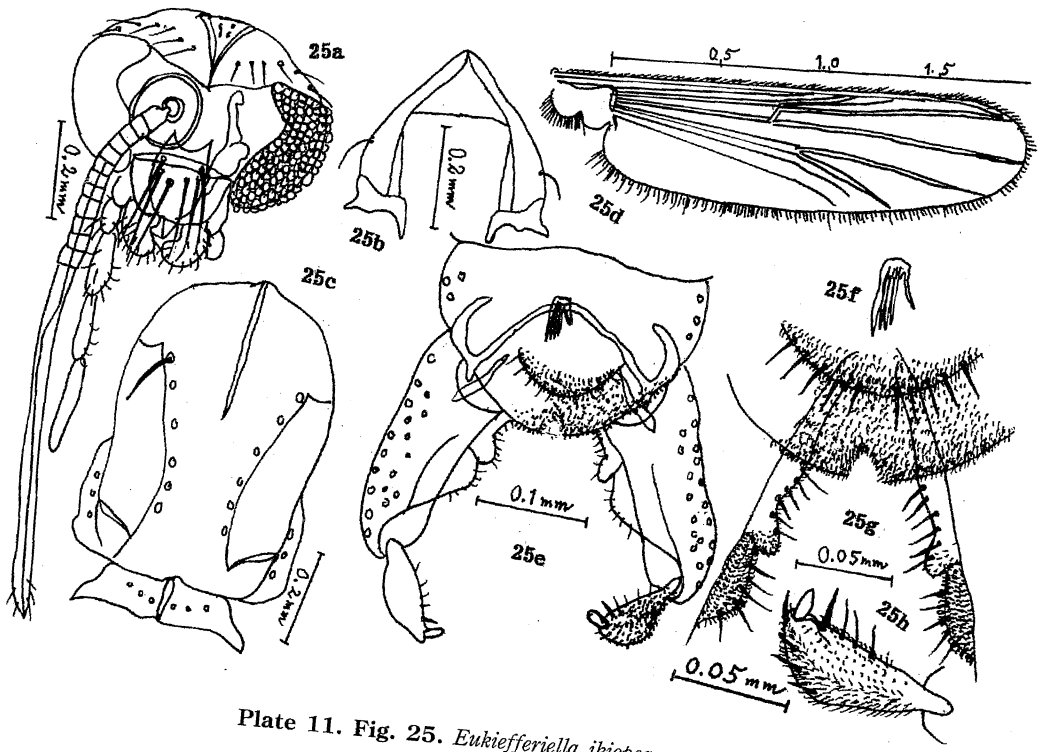

Plate 11. Fig. 25. *Eukiefferiella ikiopea* sp. nov.